Technical Manual

Evolution Bed LI156Ex

from

Hill-Rom®

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QD1551A

IMPORTANT: Refer to the last page of this manual to obtain the address of your National Hill-Rom representative:

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> **Note:** While every care has been taken to ensure that the information contained in this manual was correct at the time of going to press, Hill-Rom reserves the right to change any details and specifications without prior notice in line with a policy of continual product development.

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Notes:

1. Introduction

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Purpose of this Manual

This manual provides the information required for the normal operation and maintenance of the Hill-Rom® Evolution LI156Ex bed. It also includes a complete parts list for ordering replacement components. The parts list is located in Section 5.

WARNING

This manual describes the overall functions of the Evolution LI156Ex bed and their purpose, but is in no way meant to replace the user manual, whose purpose is to describe these aspects in detail. For preceise information relating to the use of the Evolution LI156Ex bed, see the user manual.

Note: A specific technical manual is available for previous versions of the Evolution bed: LI156A, LI156N, LI156B, LI156C, LI156Dx.

Who should use this manual?

This manual is intended to be used by facility authorised maintenance personnel only. Failure to observe this restriction can result in serious damage to equipment and/or safety risks to people.

Organisation of this manual

This manual contains seven sections.

Section 1: Introduction

You are currently reading Section 1. This section defines the manual's purpose and who should use the information in the manual. It also describes the manual's organisation and explains the various typographical conventions used throughout the manual. Also included is an introduction to the product, specifications, model identification, safety tips and the Evolution LI156Ex bed caution and warning labels.

Section 2: Troubleshooting Procedures

Section 2 contains the Evolution LI156Ex bed troubleshooting procedures. It also includes a troubleshooting introduction, initial actions, function checks and repair analysis procedures.

Section 3: Theory of Operation

Section 3 contains the hardware and software theory of operation of the Evolution bed LI156Ex. It also includes the wiring diagrams and block diagrams of the Evolution LI156Ex bed.

Section 4: Removal, Replacement and Adjustment Procedures

Section 4 includes removal, replacement and adjustment procedures for the Evolution LI156Ex bed.

Section 5: Parts List

Section 5 contains Hill-Rom's warranty, replacement part ordering procedure, exchange policy, parts lists and general service information.

Section 6: General Procedures

Section 6 contains cleaning, care and lubrication requirements, preventive maintenance and Evolution LI156Ex bed tool and supply requirements.

Section 7: Accessories

Section 7 presents the accessories for the Evolution LI156Ex bed as well as illustrations and assembly instructions.

Typographical Conventions used in this Manual

This manual contains different typographical conventions designed to enhance the readability and understanding of its content. Note the following examples:

- Standard text — used for standard text throughout the manual.
- **Boldface text** — emphasizes a word or phrase.
- **NOTA:** sets apart special information or clarification of an important instruction.
- The symbol below highlights a WARNING or CAUTION

exclam.tif

Figure 1-1. CAUTION or WARNING symbol

- A CAUTION points out special procedures or precautions that service personnel must follow to avoid equipment damage.
- A WARNING identifies situations or actions that may affect patient or user safety. Disregarding a WARNING could result in patient or user injury.
- The symbol below highlights an electric shock hazard warning:

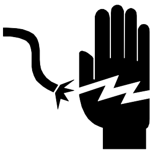
warning.tif

Figure 1-2 - WARNING symbol (Electric shock hazard)

Glossary of Abbreviations

CO	Continuous Operation
CCW	Counter Clockwise
CPR	Emergency release of Head Section for Cardio-Pulmonary Resuscitation
CW	Clockwise
DMM	Digital Multimeter
EOT	End of Travel
g/y	Green/Yellow
HS	Head-Section adjustment
HSH	Horizontal Symmetrical Headboard
IVP	I.V. Pole
KS	Knee Section
LED	Light-Emitting Diode
LS	Leg-Section
NC	Normally Closed
NO	Normally Open
PCB	Printed Circuit Board
PT	Point Test
RAP	Repair and Analysis Procedure
RS	Rest Switch
S/A	Sub-Assembly
SH	Symmetrical Headboard
Tr/Rev Tr	Trendelenburg/Reverse Trendelenburg
VAC	Volts Alternating Current
VDC	Volts Direct Current
VH	Variable Height

Operating Precautions

Before using the bed, it is important to read this manual and understand it in detail, as well as to learn and follow strictly all the safety instructions of the manual. It is also necessary to be familiar with the user manual of the bed.

Positions of the bed

The Evolution LI156Ex bed comprises:

- three adjustable sections: Head, Leg and Foot (Knee).

- height adjustment of the sleep surface level.

- inclination of the bedframe (option) in Trendelenburg (head down) or reverse Trendelenburg position (feet down).

General Description

The Hill Rom Evolution LI156Ex bed has a double control system. It is possible to use the mains power supply or a battery (optional) to use the following controls.

- Height of the bed (Variable Height)-raise/lower
- Raise/Lower Foot Section
- Raise/Lower Head Section
- Trendelenburg

These controls are electrically operated and are accessible to the patient or the caregiver from the side rails, hand-held control unit or the Variable Height pedal (VH only).

Specifications

Specifications	Dimensions
Outer length in high position (basic version): Outer length in high position with extension (option) in use	2180mm (85.8") 2360mm (92.91")
Outer width (side-rails up)	1040mm (40.9")
Outer width (side-rails down)	935mm (36.8")
Height of sleep surface (low position) depending on castor mode. (*) 10mm must be added to all dimensions for beds with the Bedside Cabinet Transport option	440mm (17.32"): double band(*) 448mm (17.64"): integral (*) 452mm (17.8"): single band(*)
Height of sleep surface (high position) depending on castor mode (*) 10mm must be added to all dimensions for beds with the Bedside Cabinet Transport option	780 mm (30.71"): double band(*) 788 mm (31.02"): integral (*) 792 mm (31.18"): single band(*)
Minimum space under bed double band castors single band castors	 150mm (5.9") 162mm (6.4")
Maximum Head Section inclination	+68°
Knee Section inclination: autocontour	16°
Maximum Knee Section inclination	+34°

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Table 1-1: Specifications of the Evolution LI156Ex Bed

Specifications	Dimensions
Maximum Foot Section from the horizontal: If KS is in high position:	+16° -22°
Sleep surface inclination with respect to horizontal: Trend./Rev. Trend.	+12°/-12°
Maximum height of side-rail above sleep surface	394mm (15.5")
Maximum weight of bed (without mattress or accessories) For "Bedside Cabinet Transport" option	172kg (379.43 lb) 168kg (370.61 lb)
Safe working load For "Bedside Cabinet Transport" option	170kg (375 lb) 220kg (485.3 lb)
maximum load lifted	250kg (551 lb)

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Table 1-2: Specifications of the Evolution LI156Ex Bed (continued)

WARNING

Refer to the user manual of the Evolution LI156Ex bed to avoid any injury to the patient or user.

Functional Description

Head Section

The Head Section of the bed can be adjusted independently in order to obtain the desired inclination up to its maximum level. This function is activated from the side-rail control, or with the hand-held control unit (accessory).

Head Section angle indicators

The labels indicating the angle of the Head Section are situated on either side of the bed on the bedframe. These labels are graduated for approximately every 10° of Head Section inclination, up to a level of 70°.

CPR Release:

The bed has an emergency lower function for the Head Section. The CPR control is situated under the angle at either side of the Head Section.

Retractable Head Section

The backward retraction of the Head Section, while the raise control is activated, enlarges the sitting area. This type of position should reduce pelvic pressure as well as the shearing forces, and allow the patient to breathe more easily.

Knee Section

The Knee Section of the bed can be adjusted independently to obtain the desired inclination up to its maximum level. This function is activated from the side-rail, or with the hand-held control unit (accessory).

Knee Section angle indicators

The labels indicating the angle of the Head Section are situated on either side of the bed on the bedframe. These labels are graduated for approximately every 10° of Knee Section inclination, up to 50°.

Foot Section

The foot section of the Evolution LI156Ex bed can be mechanically adjusted independently, to obtain the desired inclination up to its maximum level when the Knee Section is in the High position. This function allows a number of possible angles, selected by means of an release handle situated on either side of the Foot Section.

Variable Height Function

The sleep surface of the bed may be raised or lowered in order to move the patient or to facilitate getting on/off the bed. The Variable Height function must be operated by nursing staff only, using the side-rail control or the Variable Height pedal (option or accessory).

Variable Height pedal (optional or accessory)

The Evolution LI156Ex bed, has as an option or accessory, a bilateral Variable Height pedal which enables nursing staff to raise or lower the sleep surface.

Trendelenburg/Reverse Trendelenburg (optional)

The sleep surface can be inclined in 2 ways,

- **in Trendelenburg: head of bed is lowered**
- **in Reverse Trendelenburg: foot of bed is lowered.**

The maximum scope of Trendelenburg movements is obtained when the sleeping level is between the mid and high positions.

This function is activated by a handle situated at the foot of the bed.

The Trendelenburg function is assisted electrically by the Variable Height motor and Reverse Trendelenburg mechanically by a gas spring.

Auto-contour

Every Evolution LI156Ex bed has a special function called “auto-contour”. This enables the KS of the bed to be raised automatically to a preset angle when the Head Section is raised from its horizontal position, provided that the KS has not been locked on the lock-out control panel. The object of this function is to prevent the patient slipping towards the foot of the bed when the Head Section is raised.

Castors

The Evolution LI156Ex bed is equipped with 4 swivelling castors situated at the four corners of the bedframe.

Braking

The bed has a central braking system which can be foot-controlled by means of a simple pedal. Pressing it simultaneously brakes the four castors.

Steering

The Evolution LI156Ex bed has a steering system which improves handling of the bed while moving or transferring a patient. The right-hand castor of the head of the bed (patient viewpoint), or left-hand castor of the foot of the bed (optional) is fixed in a longitudinal position with respect to the bed when the pedal is pressed down. In this way the bed can be steered easily by pushing the foot or head-end of the bedframe.

Side-rails

The Evolution LI156Ex bed has side-rails situated on either side of the bed at the head and foot sections. The side rails can be raised and lowered independently and have an intermediate position for getting the patient out of the bed. The side rails at the head have controls which allow the electrical adjustment of the Head and Knee Section inclinations as well as the Variable Height function. When not used, the side rails can be stored against the sleep surface once they have been completely lowered.

Manual hand-held control unit (option or accessory)

The manual hand-held control unit is an accessory of the Evolution LI156Ex bed, and allows the patient to raise or lower the Head Section and the Knee Section.

Head and Footboards

The Evolution LI156Ex bed is equipped with vertically removable boards at the head and the foot of the bed which aid the mobility and steering of the bed by the use of integrated handles. They have slots which allow them to be quickly inserted into plastic brackets placed on bars at the head and foot.

Footboard linen holder (optional)

The Evolution LI156Ex bed has a footboard linen holder (optional) which takes the place of a removable footboard. This board folds out horizontally from the bar at the foot of the bed, and can be removed after releasing the holding clips. In this position, it provides a space to keep blankets. It can also be used as a work surface during treatment not requiring transfer. The maximum load suported is 15kg.

Board storage system and power supply cable support

The two supports at the head-end bar of the bed can be used to hold the headboard if required as well as the power supply cable when the bed is being moved. They can be stored against the head-end bar when not used.

Bed extension

The optional bed extension is designed for tall patients. It allows the overall length of the bed to be increased by 18cm by sliding the crossbar of the foot panel along its guide rails. The extension has three different positions (6/12/18cm). The mattress can be extended with the aid of a mattress extension cushion, available as an accessory, when the extension has been pulled out.

Bedside Cabinet Transport option

The optional “Bedside Cabinet Transport” function is designed to transport a bedside cabinet of the NM1B or NM2B type on support rails integral to the frame when moving the bed. The bed and bedside cabinet can be moved with or without a patient in the bed.

Protective buffers

The protective buffers are situated on the four corners of the bed, on the bedframe.

CAUTION

Removing the protective buffers may damage the bed or surrounding equipment.

I.V. Pole Sockets

The bed has four IVP sockets, placed at each corner of the bed. An I.V. pole (accessory) can be inserted into each socket. The two sockets at the patient's head also enables a patient helper to be attached.

Draining-bag hooks

The draining-bag hooks are situated in the middle, on either side of the bed, below the level of the sleep surface.

Electrical Description

WARNING

The use of electrical equipment carries a potential risk of electric shock. Personnel must be trained and instructed in the inherent risks of electrical equipment.

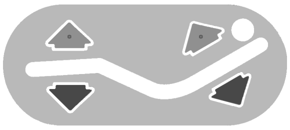
The electric circuit is physically isolated from the metal parts of the bed.

The bed is equipped with Linak® actuators for the Head Section, Knee Section and Variable Height functions, which are controlled by means of a Linak® power supply unit.

The power unit operates with 220-240VAC 50-60Hz, 110-120VAC 50-60Hz or 100VAC 50-60Hz (tolerances: see Section 3), and can be fitted with a 24VDC battery (optional). With this battery, the bed can be controlled when it is not under mains supply. A specific audible alarm can be heard when the battery power is low. It is set off when a function of the bed is activated. When the alarm sounds, the bed must be reconnected to a mains socket so that the battery can be recharged.

Every bed undergoes operating trials before delivery. Insulation and earth connection checks are carried out on each bed. All the beds have a current leakage of less than 500µA and a maximum impedance of 0.2 ohm to earth.

Patient side-rail control panels



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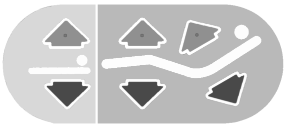
The patient side-rail control panel is located inside each side-rail of the Head Section for ease of use. The patient can control the Head and Knee Section functions by pressing the buttons with coloured labels on the two control panels.

Nurse side-rail control panels



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The nursing staff side-rail control panel is located on the outside of each side-rail of the Head Section. The control buttons face the personnel, thus reducing access for the patient. The Variable Height function of the bed can be controlled by pressing the buttons on one of the two outer control panels.

Common features of the patient and nurse control panels: the functions can be easily identified by means of colour coding (see user manual). Also, there are raised reference dots on the raising controls.

Function lock-out panel

Each electrical function of the bed must be locked out depending on the condition of the patient. The function lock-out panel is located at the foot of the bed on the chassis cover. The position of each switch on the lock-out panel is marked with a label that indicates the various functions of the bed as well as the locked/unlocked position, showing a closed padlock (locked) or an open padlock (unlocked).

Motor-driven actuators

The operation of the Head Section, the Knee Section and the Variable Height is made possible by means of three separate motor-driven actuators. They are all designed in such a way as to handle the risk of discharge of liquid products under normal conditions of use. These motor-driven actuators operate on 24 to 45VDC and have a connecting plug to facilitate dismantling should problems arise. Each actuator fulfils a particular function and has the following features:

- Positions are controlled by internal or external end of travel for the Head Section motor only. Specific feature for a bed with Trendelenburg: the Variable Height motor is switched off for lowering by a special end of travel on the chassis.
- Electronic overload protection in the power unit.
- Waterproof and shockproof motor housing (waterproof level: see Section 3).
- Permanent lubrication.

CAUTION

⚠ *The cycle of usage (intermittent operation) of the actuators must not exceed 6 min/hour. Otherwise, the equipment may be damaged.*

Regulatory Requirements

The Evolution LI156Ex bed complies with the CE Directive 93/42/CEE applicable to medical equipment.

MEDICAL

Logo_CE.wmf

logo_NF.wmf

The Evolution LI156Ex bed complies with the folloiwng standards:

NF EN 60601-1

NF EN 60601-2-38

NF EN 60601-1-2

NF S-90-312

General operation of the Evolution LI156Ex Bed

WARNING: Reminder

This manual describes the overall functions of the Evolution LI156Ex bed and their use. It is in no way meant to replace the user manual, whose purpose is to describe these aspects in detail. For precise information relating to the use of the Evolution LI156Ex bed, see the user manual.

Bed Positions

WARNING

The use of electrical equipment carries a potential risk of electric shock. Personnel must be trained and instructed in the inherent risks of electrical equipment.

Variable Height Function

In order to raise the sleep surface, press and hold the Variable Height Raise button on the side-rail control unit or Variable Height pedal. Release the button or the pedal at the desired height.

In order to lower the sleep surface, press and hold the Variable Height Lower button on the side-rail control unit or Variable Height pedal. Release the button or the pedal at the desired height.

Head Section

To raise the Head Section, press and hold the Head Section Raise button on the side-rail control unit, or on the hand-held control unit. Release the button at the desired angle.

To lower the Head Section, press and hold the Head Section Lower button on the side-rail control unit or on the hand-held control unit. Release the button at the required angle.

CPR Emergency Release

Activation of the Head Section Emergency Release function:

- Hold one side of the Head Section and activate one of the levers situated on either side.
- Keep the lever applied to control the lowering of the Head Section.

Deactivating the Head Section CPR Release function:

Simply release the lever of the Head Section, which will work normally when the Head Section "Raise" function is activated.

Knee Section

In order to raise the Knee Section, press and hold the Knee Section Raise button on the side-rail control unit or the hand-held control unit. Release the button at the desired angle.

In order to lower the Knee Section, press and hold the Knee Section Lower button on the side-rail control unit or the hand-held control unit. Release the button at the desired angle.

Auto-contour

The Autocontour function can be locked out by turning the Knee Section lock-out switch to the locked position. If this function is to be used later, the switch must be unlocked.

Bed lock-out functions

In order to lock out a function:

Turn the switch of the corresponding function to the "locked out" position (padlock closed).

In order to unlock a function:

Turn the switch of the corresponding function to the "unlocked" position (padlock open).

Steering

In order to put the bed in the steering position, step on the green mark on the brake and steer pedal. The following symbol also indicates the position of this function (see user manual).

To get out of the steering position, step on the beige mark on the brake and steer pedal to leave it in the horizontal position. The following symbol also indicates the neutral position of the pedal (see user manual).

Operation of the side-rails

To raise the side-rail:

- pull the side-rail outwards until fully extended,
- rotate the side-rail upwards into the required position (intermediate or fully raised).

Note: an audible click is heard for each position, meaning that the rails are securely locked.

To lower the side-rail:

- hold the side-rail in one hand and pull the lever outwards with the other hand.
- rotate the side-rail downwards into the required position (intermediate or fully lowered),
- release the lever,
- when the side-rail is fully lowered, push it back into position under the bed.

Braking

In order to apply the brakes on the bed, step on the beige mark on the brake and steer pedal. The following symbol also indicates the position of this function (see user manual).

To disengage the brakes, step on the green mark of the brake and steer pedal until it is horizontal. The following symbol also indicates the neutral position of the pedal (see user manual).

Trend./Rev. Trend (optional)

The sleep surface can be tilted in two directions: Trendelenburg (headend in low position), or Reverse Trendelenburg (footend in low position). To tilt the sleep surface, hold the footboard in one hand and operate the release handle with the other. Set the sleep surface to the required position then release the handle to lock the bed (you will hear a click).

Headboards and Footboards

The boards can be removed by pulling them upwards. As the headboard is not fixed, it can also be placed under the patient during CPR procedures or stored away on the supports at the head-end of the bed.

Footboard Linen holder (option)

The board is fixed to the bed by two clips under the bedframe. To release the board, unclip it then lift it upwards.

Hard surfaces in Head, Leg and Foot Sections

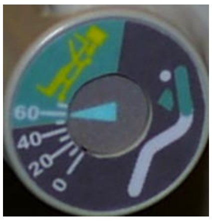
To remove the hard surfaces from the Head, Leg and Foot sections, unclip them by lifting them up. Put the panels in a safe place to avoid damage.

To install one of the hard surfaces, line up the assembly clips with the metal plugs on the bedframe. Press on the hard surface to clip it in.

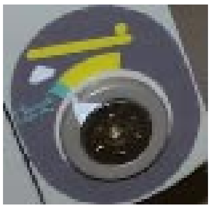
Bedside Cabinet Transport (optional)

Fitting the bedside cabinet to the bed:

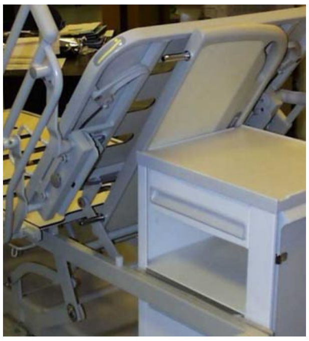
- Close the bedside cabinet doors and drawer and put the eating tray on the bed in its folded position,
- Release the brake, move the bed away from the wall to free the headend section in order to fit the bedside cabinet, then apply the brake,
- Remove the headboard,
- Set the sleep surface to the bedside cabinet loading height, and headend bedside cabinet support rails to approximately 20mm below the aluminium rails of the bedside cabinet,
- Raise the Head Section so that the lateral angle indicator lies within the green area for use of the "Bedside Cabinet Transport" option,

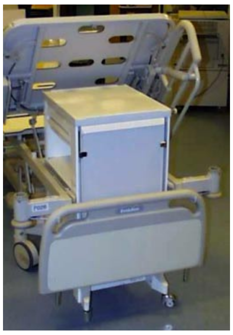


- Slide the bedside cabinet onto the support rails, with the bed's eating tray pointing outwards from the bed (headend) to prevent crushing or pulling on the power cord when fitting the bedside cabinet,
- Operate the Variable Height raise so that the bedside cabinet castors are about 30mm from the floor to prevent any impact when transproting the bed (moving through doorways, into lifts, etc.). The Rev. Trendelenburg lateral angle indicator must always lie within the green area for use of the "Bedside Cabinet Transport" option,



- Disconnect the power cord and secure it on the bed,
- Fit the headboard between the bedside cabinet and the Head Section or on the head supports,





- Lock out the electric functions of the bed before moving the bed and bedside cabinet to prevent any accidental handling that knocks the bedside cabinet against the frame of the bed.

Removing the bedside cabinet from the bed:

- Move the bed away from the wall to free the headend section in order to remove the bedside cabinet, then apply the brake,
- Connect the power cord,
- Remove the headboard,
- Unlock the electric functions of the bed,
- Operate the Variable Height lower function so that the bedside cabinet castors touch the floor and the bedside cabinet is no longer supported by the rails,
- Remove the bedside cabinet from its support rails, and avoid crushing or pulling on the power cord when carrying out this operation,
- Fit the headboard,
- Release the brake, put the bed back into its position, then apply the brake,
- Set the sleep surface to the required autocontour position.
- Unlock the electric functions if necessary.

Warning

Since the “Tendelenburg/Reverse Trendelenburg” and “Emergency CPR” functions are unavailable with the “Bedside Cabinet Transport” function, nursing staff must check whether the physiological state of the patient is compatible with the transport conditions of the bed. The bedside cabinet must be removed when the bed has been transported.

Model Identification

Model	Description
LI156Ex	Ex-series Evolution Bed

1512Atbl_101

Table 1-3. Model Identification

Safety Indications

WARNING

This manual describes the overall functions of the Evolution LI156Ex bed and their use. It is in no way meant to replace the user manual, whose purpose is to describe these aspects in detail. For precise information relating to the use of the Evolution LI156Ex bed, see the user manual.

WARNING

The use of electrical equipment carries a potential risk of electric shock. Personnel must be trained and instructed in the inherent risks of electrical equipment.

WARNING

Unplug the bed before cleaning or maintenance to avoid the risk of electric shock. See the "Evolution LI156Ex Bed User Manual" and relevant sections of this manual for additional precautions.

WARNING

Unplug the mains supply of the bed before disconnecting the power supply cables to avoid the risk of electric shock.

WARNING

Electric current flows through the connections when the bed is switched on. Technical personnel may be injured if the bed is not disconnected from its electricity supply.

WARNING

Electric current flows through the connections when the bed is switched on. Trials conducted under these conditions carry a risk of electric shock. Do not touch any wire or terminal which conducts an electric current.

WARNING

Personnel should never go under the sleep surface or up to the edge of the bed. If maintenance personnel have to go under the bed, they must use adequate supports to hold up the bedframe.

WARNING

The brake must always be on when the bed does not need to be moved. The patient may fall when leaning on the bed to climb on or off, when the brake is not on.

WARNING

Only hospital maintenance personnel may carry out maintenance procedures on the Evolution LI156Ex Beds. Otherwise, there may be a risk of injury to staff or patients.

WARNING

Only hospital maintenance personnel may carry out troubleshooting on the Evolution LI156Ex Beds. Otherwise, there may be a risk of injury to staff or patients.

WARNING

Only use the recommended accessories for the Evolution LI156Ex bed. Use of other accessories may present safety hazards for the patient or nursing staff.

WARNING

- When transporting the bed and bedside cabinet, the electric functions of the bed must be locked out.

- Never unload the bedside cabinet manually from the support.

Disregarding these precautions may result in injury.

CAUTION

Removing the protective buffers may damage the bed or surrounding equipment.

CAUTION

The cycle of usage (intermittent operation) of the actuators must not go beyond 6 min./60 min. Otherwise, the equipment may be damaged.

CAUTION

Cleaning, disinfecting: Follow the recommendations in the Evolution LI156Ex Bed User manual.

CAUTION

Do not use lubricant containing silicon on the Evolution LI156Ex Bed. The self-lubricating qualities of the bearings and rings will be affected.

Identification and warning labels

Hill-Rom
A HILLENBRAND INDUSTRY

LIT CLASSE 1 IPX4 TYPE B
230V - 50 HZ 320VA MAX
SERV. INTERMITTENT 10% 6min/h
Charge de fonctionnement
en sécurité : 170 KG
Charge maxi soulevée : 250 KG

F11088

56330 PLUVIGNER - FRANCE

1512A102.wmf

Hill-Rom
A HILLENBRAND INDUSTRY

LI156Ex - LIT CLASSE 1 IPX4 TYPE B
230V - 50 HZ 320VA MAX
SERV. INTERMITTENT 10% 6min/h
Charge de fonctionnement
en sécurité : 220 KG
Charge maxi soulevée : 250 KG

F11175

56330 PLUVIGNER - FRANCE

1512A114.wmf

Hill-Rom
A HILLENBRAND INDUSTRY

LI156Ex 123456 00 / 00 / 0000
HRP000000001

F11101

56330 PLUVIGNER - FRANCE

1512A103.wmf

Hill-Rom
A HILLENBRAND INDUSTRY

Branchement recommandé
pour une installation protégée par
différentiel au plus égal à 30 mA

F11134

56330 PLUVIGNER - FRANCE

1512A104.wmf

Hill-Rom
A HILLENBRAND INDUSTRY

Cette batterie ne doit être
montée que sur un lit équipé
de roulettes antistatiques

F11137

56330 PLUVIGNER - FRANCE

1512A105.wmf

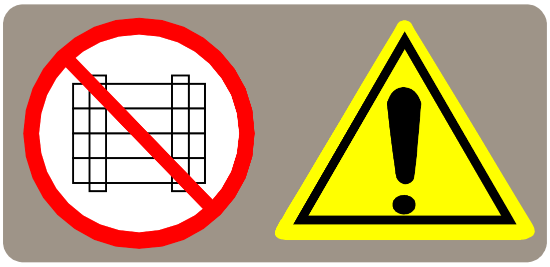
Hill-Rom
A HILLENBRAND INDUSTRY

LIT CLASSE 1 AVEC BATTERIE INTEGREE
BETT KLASSE 1 MIT INTERNER STROMVERBERROUNG
BED CLASS 1 WITH INTERNAL POWER SOURCE

F10848A

56330 PLUVIGNER - FRANCE

1512A106.wmf

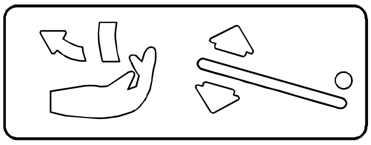


1512A107.wmf

A CHAQUE UTILISATION, TOUJOURS S'ASSURER
DU BON VERROUILLAGE DE LA BARRIERE
BEI JEDEM GEBRAUCH BITTE DAS KORREKTE
EINSCHNAPPEN DES SPERRMECHANISMUSES PRUFENE
ALWAYS CHECK THE SIDE GUARD IS LOCKED IN POSITION

1512A108.wmf

En cas d absence de courant secteur, la fonction DECLIVE
du plan de couchage, est assuree de sa position basse a sa position milieu.
If the bed is not connected to the mains supply, the TREND POSITION can only
be obtained if the bed height is from the low to the middle position.
Im Falle eines Stromausfalls kann die Trendelenburgposition nur von der tiefsten
bis zur mittleren H|henposition benutzt werden.



1512A109.wmf

Diagram 1.3 Identification and warning labels

Notes:

2. Troubleshooting Procedures

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A) Detailed Troubleshooting Method: list below

Getting Started

Begin each procedure in this section with step 1. Follow the sequence outlined (each step assumes that the previous steps are correct). Each step is the normal operational event of the product and can be confirmed by answering Y (yes) or N (no) to the question. Your response leads either to another step in the procedure, a Repair and Analysis Procedure (**RAP**), or the replacement of a component. If a number of components are mentioned, replace them in the order given.

Start with **initial actions** to collect the initial information concerning the problem.

Perform the **function checks** to isolate/identify a problem and verify the repair after completing each corrective action (replacing or adjusting a part, installation of a plug, etc.).

Perform the **final actions** after the function checks in order to verify the repair.

If troubleshooting procedures do not isolate the problem, ask for technical support from your National Hill-Rom representative: refer to the last page of this manual.

WARNING

Only maintenance personnel approved by the hospital may carry out troubleshooting on the Evolution bed.

Note 1: The purpose of this troubleshooting method is to limit as much as possible the number of spare parts necessary and the cost incurred by a breakdown analysis.

Note 2: It is recommended that you lock out the power-driven functions not concerned by the breakdown analysis before beginning, or unplug the bed if the breakdown is not connected to a power-driven function. In this case also, lock out all functions if the bed has a battery.

Initial Actions

Initial actions allow information to be collected from operators concerning the **Evolution LI156Ex** bed. Note the symptoms and any information concerning the problem that the operator has identified. This information helps to identify the probable cause.

1. **A competent person is available to explain the problem.**

Yes **No**
⇓ ⇒ Go to “Function Checks” page 2-3.

2. Ask this person to demonstrate or explain the problem.

The problem can be duplicated.
Yes **No**
⇓ ⇒ Go to “Function Checks” page 2-3.

3. The problem is due to an error on the part of the operator.

Yes **No**
⇓ ⇒ Go to “Function Checks” page 2-3.

4. Inform the operators of the necessity to refer to the user manual procedures of the **Evolution LI156Ex** bed. Perform the “Function Checks” on page 2-3 to ensure the proper operation of the **Evolution LI156Ex** bed.

Function Checks

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: To make troubleshooting easier, it is necessary to have the test hand pendant control unit (reference QD0534). This unit differs from the model sold as an accessory (ref: AD091A) as it has a VH function. This function cannot be used if the QD0534 unit is connected via the cable designed for the AD091A accessory.

1. Unlock all the functions.

Initial actions have been performed.
Yes No
⇓ ⇒ Go to “Initial Actions” page 2-2

2. Press the Raise control of the VH function, then the Raise pedal control.

The bed rises.
Yes No
⇓ ⇒ Go to **RAP 2.2** page 2-2.

3. Press the Lower control of the VH function, then the Lower pedal control.

The bed goes down.
Yes No
⇓ ⇒ Go to **RAP 2.3** page 2-8.

4. Lock out the Knee Section. Press the HS RAISE button.

The Head Section rises.
Yes No
⇓ ⇒ Go to **RAP 2.4** page 2-9.

5. Keep the KS locked out and press the HS DOWN button.

The Head Section goes down.
Yes No
⇓ ⇒ Go to **RAP 2.5** page 2-10.

6. Lock out the KS function. Press the KS RAISE button.

The Knee Section rises.
Yes No
⇓ ⇒ Go to **RAP 2.6** page 2-11.

7. Press the KS down button.

The Knee Section goes down.
Yes No
⇓ ⇒ Go to **RAP 2.7** page 2-12.

8. Press the HS RAISE button from the horizontal position of the bedframe.

The HS and KS rise simultaneously, then the KS stops at an angle approaching 16° while the HS continues to rise to its highest position.
Yes No
⇓ ⇒ Go to **RAP 2.8** page 2-13.

9. Press the HS DOWN switch from its highest position. The Head Section goes down, the Knee Section also descends when the Head Section is at an angle of about 22°.

The two sections continue to descend as far as the horizontal position.
Yes No
⇓ ⇒ Go to **RAP 2.8** page 2-13.

10. For a battery-operated bed (optional): Unplug the mains plug and test the functions already mentioned.

The bed works properly.
Yes No
⇓ ⇒ Go to **RAP 2.9** page 2-14.

11. Bed with Trendelenburg/Reverse Trendelenburg: Raise the bed to its high position and activate the Trendelenburg function.

The bed assumes a Trendelenburg position without any problem or abnormal noise.
Yes No
⇓ ⇒ Go to **RAP 2.10** page 2-14.

12. Bed with Trendelenburg/Reverse Trendelenburg: Raise the bed to its high position and activate the Reverse Trendelenburg function.

The bed drops gradually to a Reverse Trendelenburg position without any problem or abnormal noise.
Yes No
⇓ ⇒ Go to **RAP 2.11** page 2-15.

13. Press the Head Section RAISE switch until it rises to its high position. Activate the two CPR levers (emergency release of the Head Section) one at a time.

The Head Section descends quickly without any problem or abnormal noise.
Yes No
⇓ ⇒ Go to **RAP 2.12** page 2-16.

14. Press the Knee Section RAISE switch until the Knee Section is in its high position. Activate the two mechanical levers of the Adjustable Leg Section one at a time and release them so that they lock into their various catches.

The Adjustable Leg Section rises, comes down and locks into its various positions without any problem or abnormal noise.
Yes No
⇓ ⇒ Go to **RAP 2.13** page 2-16.

Go to "Final Actions" page 2-4

Final Actions

1. Perform the required preventative maintenance procedures. See “Preventive Maintenance” in Section 6 of this manual.
2. Carry out all necessary administrative tasks.

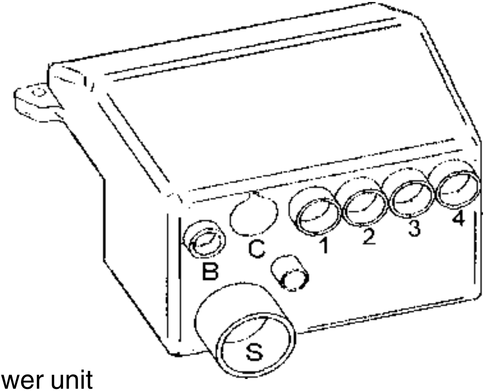
Appendices:

Appendix 1

- Two people are required to perform the test indicated.

Appendix 2

- Diagram for the power unit and T-cable with socket markings:



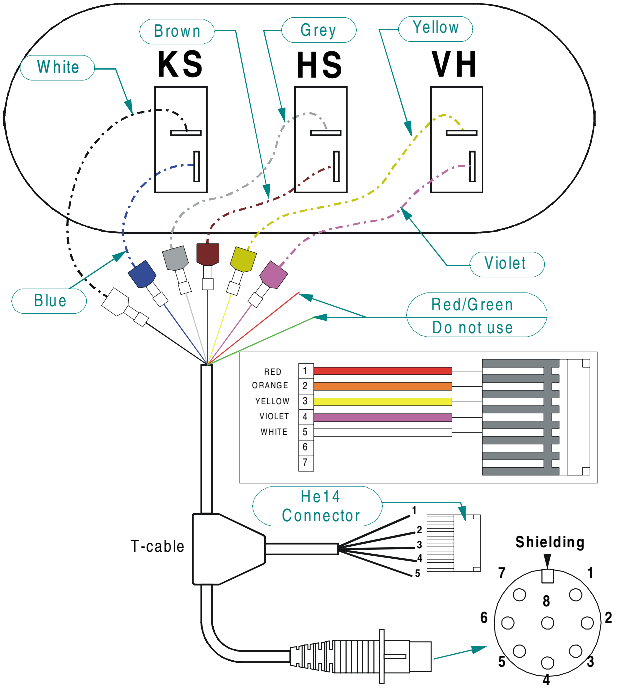
Power unit

1512A200.tif

	LI156Ex BED
S	MAINS POWER CABLE
B	BATTERY
C	CONTROL
1	T-CABLE: LOCK-OUT, VARIABLE HEIGHT PEDAL, Tr./Rev.Tr. I/O SWITCHES
2	VARIABLE HEIGHT MOTOR
3	HEAD SECTION MOTOR
4	KNEE SECTION MOTOR

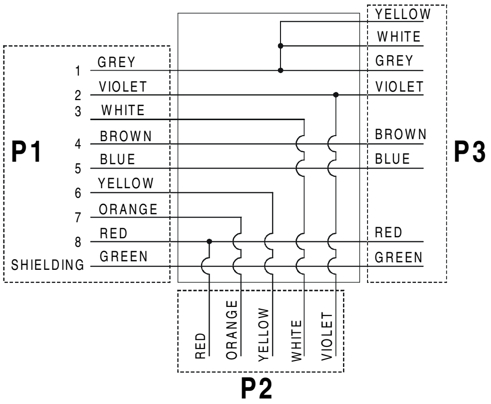
1512Atbl_200

T-cable connections


Brown
Grey
Yellow
White
KS
HS
VH
Violet
Blue
Red/Green
Do not use
RED 1
ORANGE 2
YELLOW 3
VIOLET 4
WHITE 5
6
7
He14
Connector
T-cable
1
2
3
4
5
Shielding
7
1
8
6
2
5
3
4

1512_201.wmf

T- cable wiring diagram

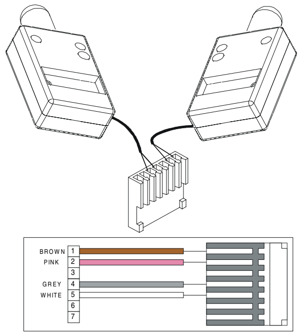

P1
1 GREY
2 VIOLET
3 WHITE
4 BROWN
5 BLUE
6 YELLOW
7 ORANGE
8 RED
SHIELDING GREEN
YELLOW
WHITE
GREY
VIOLET
BROWN
BLUE
RED
GREEN
P3
RED
ORANGE
YELLOW
WHITE
VIOLET
P2

1512A211.wmf

Trend./Rev. Trend. I/O switches

Trendelenburg: teminals 4-5,

Rev. Trendelenburg assist: terminals 1-2


BROWN 1
PINK 2
3
GREY 4
WHITE 5
6
7

1512_202.wmf

2.1 No function works

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: This RAP also assumes that no function works from the VH pedal or the hand pendant control unit, if the bed has one.

Note: Power unit connections: refer to appendix 2 page 2-4.

1. **Power unit indicator test:**

   Check that the green light on the power unit is on.

The green LED is lit.

Yes No

⇓ ⇒ Go to step 5

2. **Lock-out switch test:**

   Check that all the lock-out switches are in the "unlocked" position.

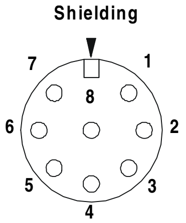
The switches are in the "unlocked" position.

Yes No

⇓ ⇒ Go to step 4

3. Turn the switches to the "unlocked" position and go to "Function Checks" on page 2-3.
4. **T-cable continuity test:**

   Disconnect socket 1 of the power unit and use an ohm-meter to check for continuity between the common: terminal 6 and terminals 2, 3, 4 and 5.



1512_203.wmf

The continuity is correct.

Yes No

⇓ ⇒ Check for continuity between each wire and the connector according to the following table, then for the continuity of the lock-out switches. Change the defective cable or switch and go to "Function Checks" page 2-3.

Wire colour	Terminal	Lock-out functions
Yellow	6	Common
White	6	Common
Grey	6	Common
Violet	4	Variable Height: raise
White	2	Variable Height: lower
Brown	5	Head Section
Blue	3	Leg Section

1512Atbl_201

5. **Power supply cable connection test:**

   Check the connection of the power cable with the unit.

The connection is correct.

Yes No

⇓ ⇒ Connect the cable properly and go to "Function Checks" on page 2-3.

WARNING

Electric current flows through the connections when the bed is switched on. Trials conducted under these conditions carry a risk of electric shock. Do not touch any wire or terminal which conducts an electric current.

6. **Mains supply test:**

   Check that the mains supply is present on the input of the power cable by disconnecting it from the power unit with a screwdriver. Measure the mains voltage with a multimeter.

The mains voltage is present.

Yes No

⇓ ⇒ Go to step 8.

7. Go to step 11.
8. Check that there is voltage on the mains plug by using a multimeter.

The mains voltage is present on the plug.

Yes No

⇓ ⇒ Repair the mains plug, and go to "Function Checks" page 2-3.

9. Change the power cable.

This solves the problem.

Yes No

⇓ ⇒ Go to step 11.

10. Go to ”Function Checks” page 2-3.
11. **Side-rail function test:**

    Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

The bed functions.
Yes No
⇓ ⇒ Go to step 13.

12. The problem is linked with the side-rail circuit. Follow **RAP 2-14.**
13. **Power unit test.**

    Replace the power unit.

This solves the problem.
Yes No
⇓ ⇒ Go to step 15.

14. Go to “Function Checks” page 2-3.
15. **VH motor test.**

    Replace the VH motor.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, see the last page of this manual.

16. Go to ”Function Checks” on page 2-3.

2.2 Bed Raise function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the VH function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No
⇓ ⇒ Go to **RAP 2.1** page 2-5.

2. **Side-rail function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

The bed rises.
Yes No
⇓ ⇒ Go to step 4

3. The problem is linked with the side-rail circuit. Follow **RAP 2-14.**
4. **Lock-out switch test:** Check for the proper functioning and electrical continuity of the VH function using an ohm-meter.

The switch functions correctly.
Yes No
⇓ ⇒ Change the switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

5. **The bed is equipped with a battery.**

Yes No
⇓ ⇒ Go to step 8

6. **Battery test:** Disconnect the battery.

The bed functions normally.
Yes No
⇓ ⇒ Go to step 8

7. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
8. **Trend./Rev. Trend switch test:** If the bed has the Trendelenburg/Reverse Trendelenburg function, disconnect the Trend./Rev. Trend Switch I/O.

The bed rises.
Yes No
⇓ ⇒ Go to step 10

9. Replace the Trend./Rev. Trendelenburg switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
10. **Pedal function test.** If the bed has the VH pedal function, open the chassis junction box and disconnect the pedal connector.

The bed rises.
Yes No
⇓ ⇒ Go to step 12

11. The problem is linked with the VH pedals. Follow **RAP 2-15**.
12. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the yellow wire, then between terminal 4 and the violet wire on the switches (see Appendix 1 and 2 page 2-4).

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

13. Using an ohm-meter, check for an open circuit between terminal 7, terminal 1 and terminal 8 (see Appendix 1 page 2-4).

There is an open circuit.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

14. **Printed circuit test:**

Using an ohm-meter, check the continuity of the different tracks of the printed circuit using the terminals available.

There is continuity.
Yes No
⇓ ⇒ Change the defective printed circuit and go to “Function Checks” page 2-3.

15. **Power unit test:** Replace the power unit.

This solves the problem.
Yes No
⇓ ⇒ Go to step 17

16. Go to “Function Checks” page 2-3,
17. **VH motor test:** Replace the Variable Height motor.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manuel.

18. Go to ”Function Checks” on page 2-3.

2.3 Bed Lower function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the VH function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No
⇓ ⇒ Go to **RAP 2.1** page 2-5.

2. **Battery function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

The bed lowers.
Yes No
⇓ ⇒ Go to step 4

3. The problem is linked with the side-rail circuit. Follow **RAP 2-14.**
4. **Lock-out switch test:** Check for the proper functioning and electrical continuity of the VH function using an ohm-meter.

The switch functions correctly.
Yes No
⇓ ⇒ Change the switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

5. **The bed is equipped with a battery.**

Yes No
⇓ ⇒ Go to step 8

6. **Battery test:** Disconnect the battery.

The bed functions normally.
Yes No
⇓ ⇒ Go to step 8

7. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
8. **The bed has the Trendelenburg/Reverse Trendelenburg function.**

Yes No
⇓ ⇒ Open the chassis junction box and check that there is or fit, the Trendelenburg shunt connector (see figure1) to connector C1, C2 or C3 (according to availability) of the printed circuit. If this solves the problem, go to “Function Checks” page 2-3. Otherwise, go to step 11.

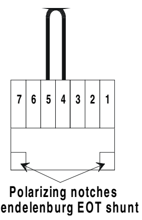


Figure 1

9. **Trend./Rev. Trend. switch test:** If the bed has the Trendelenburg/Reverse Trendelenburg function, open the chassis junction box and disconnect the Trendelenburg I/O switch. Check the EOT continuity between terminals 4 and 5 of the HE14 connector (refer to Appendix 2, page 2-4). There should be a NC (Normally Closed) contact.

The End-of-Travel functions.
Yes No
⇓ ⇒ Replace the Trendelenburg/Reverse Trendelenburg switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.

10. **Pedal function test:** If the bed has the VH pedal function, open the chassis junction box and disconnect the pedal connector.

The bed lowers.
Yes No
⇓ ⇒ Go to step 12

11. The problem is linked with the VH pedals. Follow **RAP 2-15.**
12. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the yellow wire, then between terminal 4 and the violet wire on the switches (refer to Appendices 1 and 2, page 2-4). Then check for continuity between terminal 8 and the red wire, between terminal 1 and the orange wire, between terminal 2 and the white wire, as well as between terminal 7 and the yellow wire on the HE14 connector.

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

13. Using an ohm-meter, check for an open circuit between terminal 7, terminal 1 and terminal 8 (refer to Appendices 1 and 2, page 2-4)

There is an open circuit.

Yes No

⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

14. **Printed circuit test:**

Using an ohm-meter, check the continuity of the different tracks of the printed circuit using the terminals available.

There is continuity.

Yes No

⇓ ⇒ Change the defective printed circuit and go to “Function Checks” page 2-3.

15. **Power unit test:** Replace the power unit.

This solves the problem.

Yes No

⇓ ⇒ Go to step 17

16. Go to “Function Checks” page 2-3,
17. **VH motor test:** Replace the Variable Height motor.

This solves the problem.

Yes No

⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manuel.

18. Go to ”Function Checks” on page 2-3.

2.4 Head Section Raise function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the HS function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No

⇓ ⇒ Go to **RAP 2.1** page 2-5.

2. **HS motor engagement test:**

The motor seems to be running while out of gear.

Yes No

⇓ ⇒ Go to step 4.

3. Check that the HS motor engagement cable is not too taut (refer to Section 4).

The engagement cable is adjusted correctly.

Yes No

⇓ ⇒ Lower the Head Section completely in order to adjust the engagement cable. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to step 4.

4. **Side-rail function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

WARNING

The Head Section EOTs are not controlled if the "control” input connector is unplugged. Do not operate the HS motor at the upper and lower end-of-travels.

Disregarding this precaution may damage the motor engagement and provoke injuries.

The Head Section rises.

Yes No

⇓ ⇒ Go to step 6

5. The problem is linked with the side-rails circuit. Follow **RAP 2-14.**
6. **Lock-out switch test:** Check for the proper functioning and electrical continuity of the HS function lock-out switch using an ohm-meter.

The switch functions correctly.

Yes No

⇓ ⇒ Change the switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

7. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the grey wire, then between terminal 5 and the brown wire at the switches (see Appendices 1 and 2 page 2-4).

There is continuity.

Yes No

⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

8. Plug the bed back in.

The bed has a battery.

Yes No

⇓ ⇒ Go to step 11

9. **Battery test:** disconnect the battery.

The bed functions normally.

Yes No

⇓ ⇒ Go to step 11

10. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
11. **Head Section motor test:** Replace the HS motor with its switch management system.

This solves the problem.

Yes No

⇓ ⇒ Go to step 13.

12. Go to ”Function Checks” on page 2-3.
13. **Power unit test:** Replace the HS motor and change the power unit.

This solves the problem.

Yes No

⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

14. Go to ”Function Checks” on page 2-3.

2.5 Head Section Lower function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the HS function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No

⇓ ⇒ Go to **RAP 2.1**, page 2-5.

2. **Side-rail function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

WARNING

The Head Section EOTs are not controlled if the "control” input connector is unplugged. Do not operate the HS motor at the upper and lower end-of-travels.

Disregarding this precaution may damage the motor engagement and provoke injuries.

The HS lowers.

Yes No

⇓ ⇒ Go to step 4

3. The problem is linked with the side-rails circuit. Follow **RAP 2-14.**
4. **Lock-out switch test:** Check for the proper functioning and electrical continuity of the HS function lock-out switch using an ohm-meter.

The switch functions correctly.

Yes No

⇓ ⇒ Change the switch. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

5. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the grey wire, then between terminal 5 and the brown wire at the switches (see Appendices 1 and 2 page 2-4).

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

6. **The bed has a battery.**

Yes No
⇓ ⇒ Go to step 9.

7. **Battery test:** Disconnect the battery.

The bed functions normally.
Yes No
⇓ ⇒ Go to step 9.

8. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
9. **Head Section motor test:** Replace the HS motor and its switch management system.

This solves the problem.
Yes No
⇓ ⇒ Go to step 11.

10. Go to ”Function Checks ” page 2-3.
11. **Power unit test:** Replace the HS motor and change the power unit.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

12. Go to ”Function Checks” on page 2-3.

2.6 Knee Section Raise function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the KS function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No
⇓ ⇒ Go to **RAP 2.1**, page 2-5.

2. **Side-rail function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

The KS rises.
Yes No
⇓ ⇒ Go to step 4.

3. The problem is linked with the side-rails circuit. Follow **RAP 2-14.**
4. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the white wire, then between terminal 3 and the blue wire at the switches (see Appendices 1 and 2 page 2-4).

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

5. **The bed has a battery.**

Yes No
⇓ ⇒ Go to step 8.

6. **Battery test:** Disconnect the battery.

The bed functions normally.
Yes No
⇓ ⇒ Go to step 8.

7. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
8. **Knee Section motor test:** Replace the KS motor.

This solves the problem.
Yes No
⇓ ⇒ Go to step 10.

9. Go to ”Function Checks” on page 2-3.
10. **Power unit test:** Replace KS motor and change the power unit.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, see the last page of this manual.

11. Go to ”Function Checks” on page 2-3.

2.7 Knee Section Lower function not working

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the KS function lock-out switch is in the "unlocked" position.

1. **At least one of the other functions is working.**

Yes No
⇓ ⇒ Go to **RAP 2.1**, page 2-5.

2. **Side-rail function test:** Disconnect the “control” input connector from the power unit and connect the 3-function test unit QD0534.

The KS lowers.
Yes No
⇓ ⇒ Go to step 4.

3. The problem is linked with the side-rails circuit. Follow **RAP 2-14.**
4. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 6 and the white wire, then between terminal 3 and the blue wire at the switches (see Appendices 1 and 2 page 2-4).

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, go to the next step.

5. Plug the bed back in.

The bed has a battery.
Yes No
⇓ ⇒ Go to step 8.

6. **Battery test:** Disconnect the battery.

The bed functions normally.
Yes No
⇓ ⇒ Go to step 8.

7. Replace the battery. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.
8. **Knee Section motor test:** Replace the KS motor.

This solves the problem.
Yes No
⇓ ⇒ Go to step 10.

9. Go to ”Function Checks” on page 2-3.
10. **Power unit test:** Replace KS motor and change the power unit.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

11. Go to ”Function Checks” on page 2-3.

2.8 The Autocontour does not work

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the HS and KS function lock-out switches are in the "unlocked" position.

1. **HS and KS function test:** Perform the ”Function Checks” on page 2-3 up to step 7.

The 7 steps were performed with no problems.
Yes No
⇓ ⇒ Perform the required **RAP's** in the ”Function Checks” on page 2.3 and return to step 1 of the **RAP**.

2. **Autocontour raise test:** Press the raise button of the HS function from the horizontal position of the bedframe.

The Head Section and Knee Section rise simultaneously, and the Knee Section stops at an angle approaching 16° while the Head Section continues to rise to its highest position.
Yes No
⇓ ⇒ Replace the KS motor. If this solves the problem, go to “Function Checks” on page 2-3. Otherwise, change the power unit and go to “Function Checks” on page 2-3.

3. **Autocontour lower test:** Press the lower button of the “Head Section” function from its highest position. The Head Section lowers, then the Knee Section begins to lower when the Head Section is at an angle approaching 22°.

Both sections continue to lower until they reach the horizontal position.
Yes No
⇓ ⇒ Replace the HS actuator with its switch management system. If this solves the problem, go to “Function Checks” on page 2-3. Otherwise, change the power unit and go to “Function Checks” on page 2-3.

4. Go to ”Function Checks” on page 2-3.

2.9 Abnormal working of the bed when running on the battery (optional).

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the function lock-out switches are in the "unlocked" position.

1. **Connect the bed to a mains plug. Disconenct the battery.**
2. Perform the ”Function Checks” on page 2-3 up to step 7.

The 7 steps were performed with no problems.
Yes No
⇓ ⇒ Perform the required **RAP's** in the ”Function Checks” on page 2.3 and return to step 1 of the **RAP**.

3. **Battery charge test:** Connect the battery. Leave the bed connected to the mains for about ten hours. Then disconnect the mains and perform the ”Function Checks ” on page 2-3 up to step 7 without carrying out the proposed **RAP**s.

The 7 steps were performed with no problems.
Yes No
⇓ ⇒ Go to step 4.

4. It is important to note that the battery must be recharged immediately after use. Perform the ”Function Checks ” on page 2-3.
5. **Battery test:** Connect a new battery. connect the bed to a mains source for 2 minutes then unplug it. Perform the ”Function Checks” on page 2-3 up to step 7 without carrying out the proposed **RAP**s.

The 7 steps were performed with no problems.
Yes No
⇓ ⇒ **Power unit test:** Replace the power unit. If this solves the problem, perform the ”Function Checks” on page 2-3. Otherwise contact your National Hill-Rom representative, refer to the last page of this manual.

6. Install the new battery on the bed, then perform the ”Function Checks” on page 2-3.

2.10 Reverse Trendelenburg does not function correctly

Note: Refer to the abbreviations on page 1-3 of this manual.

Note: Power unit connections: refer to appendix 2 page 2-4.

Check that the VH function lock-out switch is in the "unlocked" position.

1. Perform the ”Function Checks ” on page 2-3 up to step 3.

The 3 steps were performed with no problems.
Yes No
⇓ ⇒ Perform the required **RAP's** in the ”Function Checks” on page 2.3 and return to step 1 of the **RAP**.

2. **Trendelenburg test:** Press the bed raise control until the bed reaches its high position. Initiate the Trendelenburg function.

The Trendelenburg function works.
Yes No
⇓ ⇒ Go to step 7.

3. **Reverse Trendelenburg Assist switch test**: Open the chassis junction box and disconnect the Trendelenburg/Reverse Trendelenburg assist I/O switch. Test the operation of the Reverse Trendelenburg Assist switch with an ohm-meter between terminals 1 and 2 of the HE14 connector (refer to Appendix 2, page 2-4). There should be a NO (Normally Open) contact.

The switch functions.
Yes No
⇓ ⇒ Replace the Trendelenburg Assist switch and go to ”Function Checks” on page 2-3.

4. **T-cable test**: Disconnect connector 1 from the power unit and use an ohm-meter to check the continuity between terminal 1 and the orange wire, then between terminal 8 and the red wire at the HE14 connector (refer to Appendices 1 and 2, page 2-4).

There is continuity.
Yes No
⇓ ⇒ Replace the T-cable and plug the bed back in. If this solves the problem, go to "Function Checks" on page 2-3. Otherwise, change the power unit and go to "Function Checks" on page 2-3.

5. **Power unit test:** Change the power unit.

This solves the problem.
Yes No
⇓ ⇒ Go to step 7.

6. Go to ”Function Checks” on page 2-3.
7. **Check the mechanical condition of the bed:** Check that screws, bolts or pins are not damaged or missing at the handle or the Trendelenburg/ Reverse Trendelenburg mechanism (refer to the corresponding assembly drawing in section 5).

There are no missing or damaged catches, screws or pins.
Yes No
⇓ ⇒ Replace the damaged or missing parts and go to ”Function Checks ” page 2-3.

8. **Trendelenburg/Reverse Trendelenburg control cable:** Check that the Trendelenburg/ Reverse Trendelenburg cable is not broken.

The cable is intact.
Yes No
⇓ ⇒ Replace the cable by referring to procedure 4.12 of Section 4.

9. **Cable adjustment control:** Check that the Trendelenburg/Reverse Trendelenburg cable adjustment is correct by referring to procedure 4.12.

The adjustment is correct.
Yes No
⇓ ⇒ Adjust the cable by referring to procedure 4.12 of Section 4.

10. Replace the Trendelenburg/Reverse Trendelenburg mechanism by referring to procedure 4.13, Section 4.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

11. Perform the ”Function Checks” on page 2-3.

2.11 Trendelenburg does not function correctly

1. Perform the ”Function Checks ” on page 2-3 up to step 3.

The 3 steps were performed with no problems.
Yes No
⇓ ⇒ Perform the required **RAP**'s in the ”Function Checks” on page 2-3 and return to step 1 of the **RAP**.

2. The Trendelenburg function works but the movement is too rapid.

Yes No
⇓ ⇒ Go to step 4.

3. Replace the Trendelenburg gas spring by referring to procedure 4.14, Section 4, and go to ”Function Checks” on page 2-3.
4. **Check the mechanical condition of the bed:** Check that screws, catches or pins are not damaged or missing at the handle or the Trendelenburg/Reverse Trendelenburg mechanism (refer to the corresponding assembly drawing in Section 5).

There are no missing or damaged catches, screws or pins.
Yes No
⇓ ⇒ Replace the damaged or missing parts and go to ”Function Checks ” page 2-3.

5. Check that the Trendelenburg/Reverse Trendelenburg cable is not broken.

The cable is intact.
Yes No
⇓ ⇒ Replace the cable by referring to procedure 4.12 of Section 4.

6. Check that the Trendelenburg/Reverse Trendelenburg cable adjustment is correct by referring to procedure 4.12.

The adjustment is correct.
Yes No
⇓ ⇒ Adjust the cable by referring to procedure 4.12 of Section 4.

7. Replace the Trendelenburg/Reverse Trendelenburg mechanism by referring to procedure 4.13, Section 4.

This solves the problem.
Yes No
⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

8. Perform the ”Function Checks ” on page 2-3.

2.12 CPR release does not function correctly

1. Perform the "Function Checks" on page 2-3 up to step 5.

   The 5 steps were performed with no problems.
   Yes No
   ⇓ ⇒ Perform the required **RAP**'s in the ”Function Checks” on page 2-3 and return to step 1 of the **RAP**.

2. **Check the mechanical condition of the bed:** Remove the laminated hard surfaces from the bedframe. Check that screws, catches or pins are not damaged or missing near the release handles or the Trendelenburg/Reverse Trendelenburg mechanism (refer to the corresponding exploded assembly diagram, Section 5).

   There are no missing or absent bolts, screws or pins.
   Yes No
   ⇓ ⇒ Replace the damaged or missing parts and go to "Function Checks" on page 2-3.

3. **Cable check:** Check that the gear cable(s) is/are not broken.

   The cable(s) is/are intact.
   Yes No
   ⇓ ⇒ Replace the gear cable(s) by referring to procedure 4.16, Section 4.

4. Check that the gear cable adjustment is correct by referring to procedure 4.16.

   The adjustment is correct.
   Yes No
   ⇓ ⇒ Adjust the cable(s) by referring to procedure 4.16, Section 4.

5. Replace the HS motor by referring to procedure 4-9.

   This solves the problem.
   Yes No
   ⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

6. Perform the ”Function Checks” on page 2-3.

2.13 Leg Section mechanism does not function correctly

1. Unlock the KS function. Press the KS RAISE control until the bed reaches the high position.

   The section rises normally.
   Yes No
   ⇓ ⇒ Go to **RAP 2.6** of Section 4.

2. **Check the mechanical condition of the bed:** Remove the laminated hard surfaces from the footend of the bedframe. Check that screws, catches or pins are not damaged or missing near the release handles or the Leg Section mechanism.

   There are no missing or absent catches, screws or pins.
   Yes No
   ⇓ ⇒ Replace the damaged or missing parts and go to "Function Checks" on page 2-3.

3. **Cable check:** Check that the double cable of the Leg Section mechanism is not broken.

   The cable is intact.
   Yes No
   ⇓ ⇒ Replace the cable by referring to procedure 4.22 of Section 4.

4. **Cable adjustment check:** Check that the Leg Section mechanism cable adjustment is correct by referring to procedure 4.22 of Section 4.

   The adjustment is correct.
   Yes No
   ⇓ ⇒ Adjust the cable for each handle by referring to procedure 4.22, Section 4.

5. Replace the Leg Section mechanism by referring to procedure 4.23, Section 4.

   This solves the problem.
   Yes No
   ⇓ ⇒ Contact your National Hill-Rom representative, refer to the last page of this manual.

6. Perform the “Function Checks” on page 2-3.

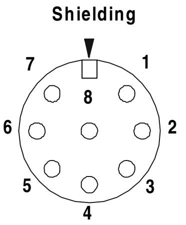
2.14 Troubleshooting for side-rails and hand pendant control unit

Note: Hand pendant control unit is optional or an accessory.

Note: Hand pendant control unit cable (option) does not have wires for the VH function.

Unplug the bed from the mains supply.

1. Disconnect the “control” input connector from the power unit (connection: refer to Appendix 2, page 2-4). Check for electrical continuity between terminal 8 (common) and the terminal of the faulty function on the round male 8-pin connector using an ohm-meter. Test both side-rails and the hand pendant control unit while pressing the control corresponding to the function being tested.



1512_203.wmf

Function	8-point round male connector
HS Lower	2
HS Raise	3
KS Raise	7
KS Lower	4
VH Lower	1
VH Raise	9
Common	8

1512Atbl_202

The resistance must be 100 ohms when the control is pressed and infinite when released.
Yes No
⇓ ⇒ Go to step 3.

2. The problem does not come from the side-rail or the hand pendant control unit. Contact your National Hill-Rom representative, refer to the last page of this manual.
3. **The bed has the hand pendant control unit option.**

Yes No
⇓ ⇒ Go to step 6.

4. **The problem only occurs with the hand pendant control unit.**

Yes No
⇓ ⇒ Go to step 6.

5. **Hand pendant control unit cable test.**

   Open the junction box, remove the printed circuit board, then remove the connector corresponding to the hand pendant control unit. Test the electrical continuity between the terminals of the faulty functions using an ohm-meter (see table).

Function	7-pin flat female connector	8-pin round male connector
HS Lower	1 white	2
HS Raise	2 blue	3
KS Raise	3 yellow	7
KS Lower	4 violet	4
Common	7 red	8

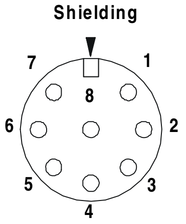
1512Atbl_203

There is continuity.
Yes No
⇓ ⇒ Replace the defective hand pendant control unit cable and go to "Function Checks" on page 2-3.

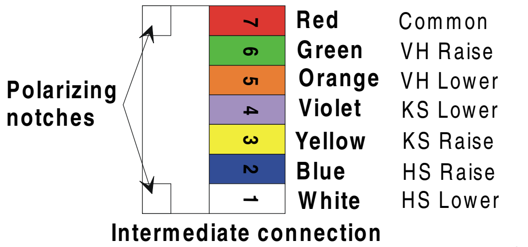
6. **The problem only occurs from the side-rail.**

Yes No
⇓ ⇒ **Test the cable linking the printed circuit with the power unit:**

Open the bedframe junction box, remove the printed circuit board. Remove the connector of the cable linking the printed circuit with the power unit. Disconnect the "control" input connector from the power unit. Test the electrical continuity between the terminals of the faulty functions using an ohm-meter (see diagrams and table).



1512_203.wmf



1512_205.wmf

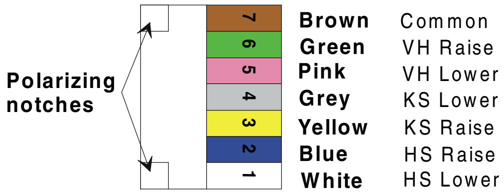
Function	7-pin flat female connector	8-pin round male connector
HS Lower	1 white	2
HS Raise	2 blue	3
KS Raise	3 yellow	7
KS Lower	4 violet	4
VH Lower	5 orange	1
VH Raise	6 green	9
Common	7 red	8

1512Atbl_204

If there is good continuity go to step 6. Otherwise, change the defective cable and go to "Function Checks" on page 2-3.

7. **Side-rail function test:**

   Open the junction box, remove the printed circuit board. Remove the connector of the side-rail to be tested. Test the electrical continuity between terminal 7 (brown) and the terminal of the faulty function (see figure below) while pressing the control of the function to be tested.


Polarizing notches
7
6
5
4
3
2
1
Brown Common
Green VH Raise
Pink VH Lower
Grey KS Lower
Yellow KS Raise
Blue HS Raise
White HS Lower

Side-rail circuit connector

1512_206.wmf

There is continuity.
Yes No
⇓ ⇒ Perform the tests in steps 10 and 11 then return to step 7 for the other side-rail.

8. **Printed circuit test:**

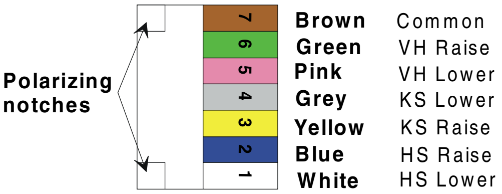
   Using an ohm-meter, test the electrical continuity of the different tracks of the printed circuit, using the available terminals.

There is continuity.
Yes No
⇓ ⇒ Replace the defective printed circuit and go to "Function Checks" on page 2-3.

9. Contact your National Hill-Rom representative, refer to the last page of this manual.

10. **Touchpad test:**

    Open the defective touchpad. Unplug the connector in the side-rail and test the continuity in the touchpad using an ohm-meter, between the common terminal (brown) and the terminals corresponding to the defective function (see figure below, no colours on the touchpad). Carry this out while pressing the control corresponding to the defective function.


Polarizing notches
7
6
5
4
3
2
1
Brown Common
Green VH Raise
Pink VH Lower
Grey KS Lower
Yellow KS Raise
Blue HS Raise
White HS Lower

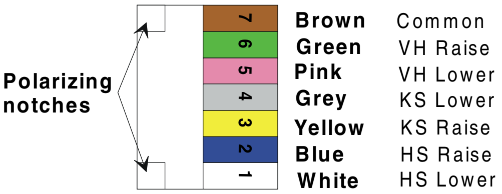
Side-rail circuit connector

1512_206.wmf

There is continuity.
Yes No
⇓ ⇒ Change the defective touchpad and go to "Function Checks" on page 2-3.

11. **Side-rail cable test:**

    On the printed circuit, unplug the connector corresponding to the side-rail being tested. Test the electrical continuity of the cable between the terminals corresponding to the faulty function in the low, middle and high positions of the side-rail (refer to Appendix 1, page 2-4).


Polarizing notches
7
6
5
4
3
2
1
Brown Common
Green VH Raise
Pink VH Lower
Grey KS Lower
Yellow KS Raise
Blue HS Raise
White HS Lower

Side-rail circuit connector

1512_206.wmf

There is continuity.
Yes No
⇓ ⇒ Replace the side-rail cable. If this solves the problem, go to "Function Checks" on page 2-3.

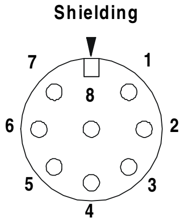
12. The problem is not related to a side-rail. Contact your National Hill-ROM representative, refer to the last page of this manual.

2.15 Troubleshooting for Variable Height pedal

Note: Pedals are optional or an accessory.

Unplug the bed from power supply.

1. Disconnect connector 1 from the power unit (connection: refer to Appendix 2, page 2-4). Test the electrical continuity between terminal 8 (common) and the terminal of the faulty function on the round male 8-pin plug using an ohm-meter, while pressing the corresponding pedal. Test both pedals.


Shielding
7
1
8
6
2
5
3
4

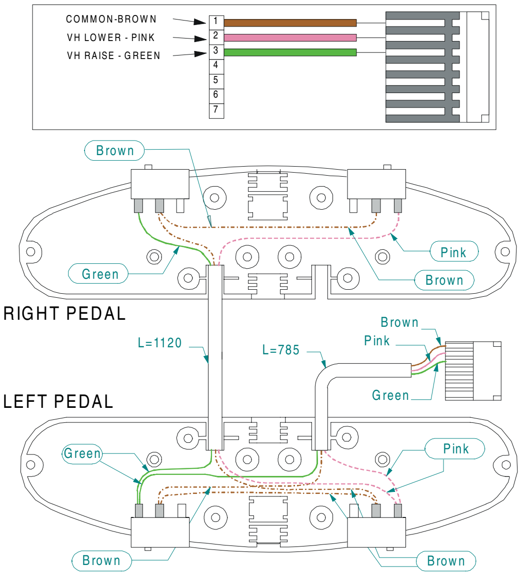
1512_203.wmf

Function	8-pin round male connector
VH Lower	2
VH Raise	4
Common	8

1512Atbl_205

There is continuity.
Yes No
⇓ ⇒ Go to step 3.

2. The problem does not come from the pedals. Contact your National Hill-ROM representative, refer to the last page of this manual.
3. Open the chassis junction box and disconnect the pedal connector. Use an ohm-meter to test the continuity between terminal 1 and the terminal of the faulty function of the HE14 connector (see figure below) by pressing on the side of the corresponding pedal. Test both pedals.


COMMON-BROWN
VH LOWER - PINK
VH RAISE - GREEN
1
2
3
4
5
6
7
Brown
Green
Pink
Brown
RIGHT PEDAL
L=1120
L=785
Brown
Pink
Green
LEFT PEDAL
Green
Pink
Brown
Brown

1512_207.wmf

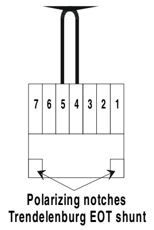
There is continuity.
Yes No
⇓ ⇒ Replace the pedal assembly (cable + switch assembly) and go to ”Function Checks” on page 2-3.

4. The problem does not come from the pedals. Contact your National Hill-ROM representative, refer to the last page of this manual.

B) Simplified general troubleshooting method for the LI156Ex

Use of this method assumes access to the following parts kit:

- a three-function remote control, ref.: QD0534
- one lock-out stopper. There is no reference number for this, but it can be made easily. On a QD0563 cable, cut the cable 10cm from the connector, strip the grey, violet, white, blue and brown wires and solder them together. The other wires must be removed (cut at source). Caution: disregarding this precaution may cause the power unit to fail when connecting to it. Protect the wires with insulating tape.
- A Trendelenburg shunt connector, ref.: LTZ1379.



1512_204.wmf

This method consists of:

- a front view of the power unit CB09.
- a table showing the connections of the various elements to the power unit: table A.
- a table specifying the meaning and the **probable solution** for basic faults: table B.
- The troubleshooting method as such, comprising:
  - The operating mode before diagnosis
  - Step 1
  - Step 2

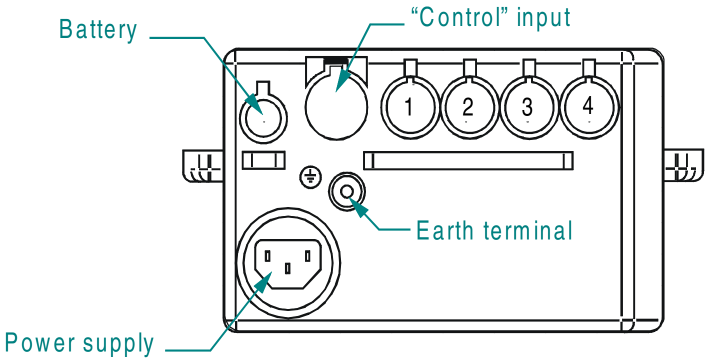
Abbreviations used in steps 1 and 2:

- VH: Variable Height
- HS: Head Section
- KS: Knee Section
- EOT: End Of Travel

PROCEDURE:

When an operating fault has been noticed, consult table B to see if the symptoms found are described there. If this is the case, follow the instructions given in the diagnosis column. If this is not the case, go to the troubleshooting method: steps 1 and 2. In any case, if the problem cannot be identified, refer to the "detailed troubleshooting method", pages 2-2 to 2-19. For the connections to the power unit, refer to the front view of the unit and table A.

FRONT VIEW OF THE UNIT



1512_208.wmf

Table A:

Control input	1	2	3	4
Right and left-hand touchpads + hand pendant control unit (optional)	T-cable	VH motor	HS motor	KS motor

1512Atbl_206

Table B:

BASIC FAULTS

FAULT	FAULT DIAGNOSIS
Variable Height lowers without the touchpad being pressed	EOT assist
Variable Height Raise is correct but not VH Lower	Trendelenburg EOT
CB09 beeps each time one of the switches is pressed if the power unit only has battery power	Battery is flat

1512Atbl_207

TROUBLESHOOTING METHOD

In order to best troubleshoot a defective bed, follow the operating mode before diagnosis, then use the Step 1 and Step 2 tables.

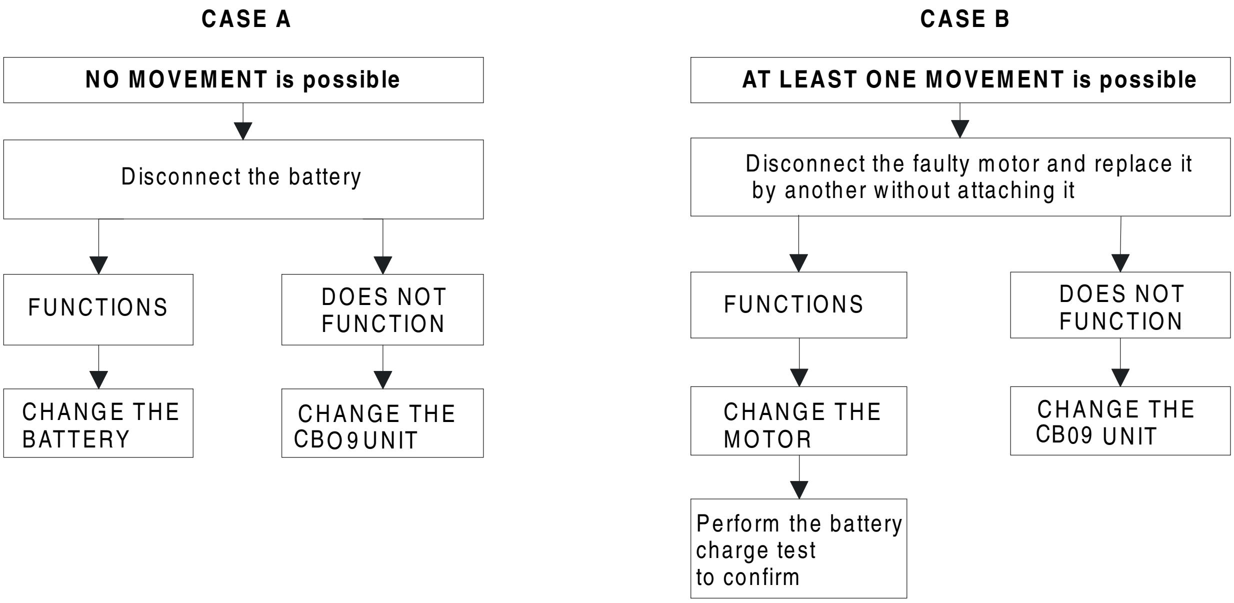
The Step 2 table should only be used if the defect is still present after changing the CB09 power unit.

OPERATING MODE BEFORE DIAGNOSIS

* Set the lock-out switches to the "unlocked" position (allows all movements).
* Check that the mains supply is present (according to the country). Note: the green LED of the power supply is an indication, but it may be blown).
* Check that the wires of the lock-out switches are properly connected to the switches.
* Check that the cables are in good condition (no cut or pinched cables).
* Check that the CB09 power unit connectors are properly connected.
* Unplug the bed for 3 seconds then plug it in again.
* Carry out the movements with the righthand and lefthand touchpad in both the up and down directions to test the operational functions.

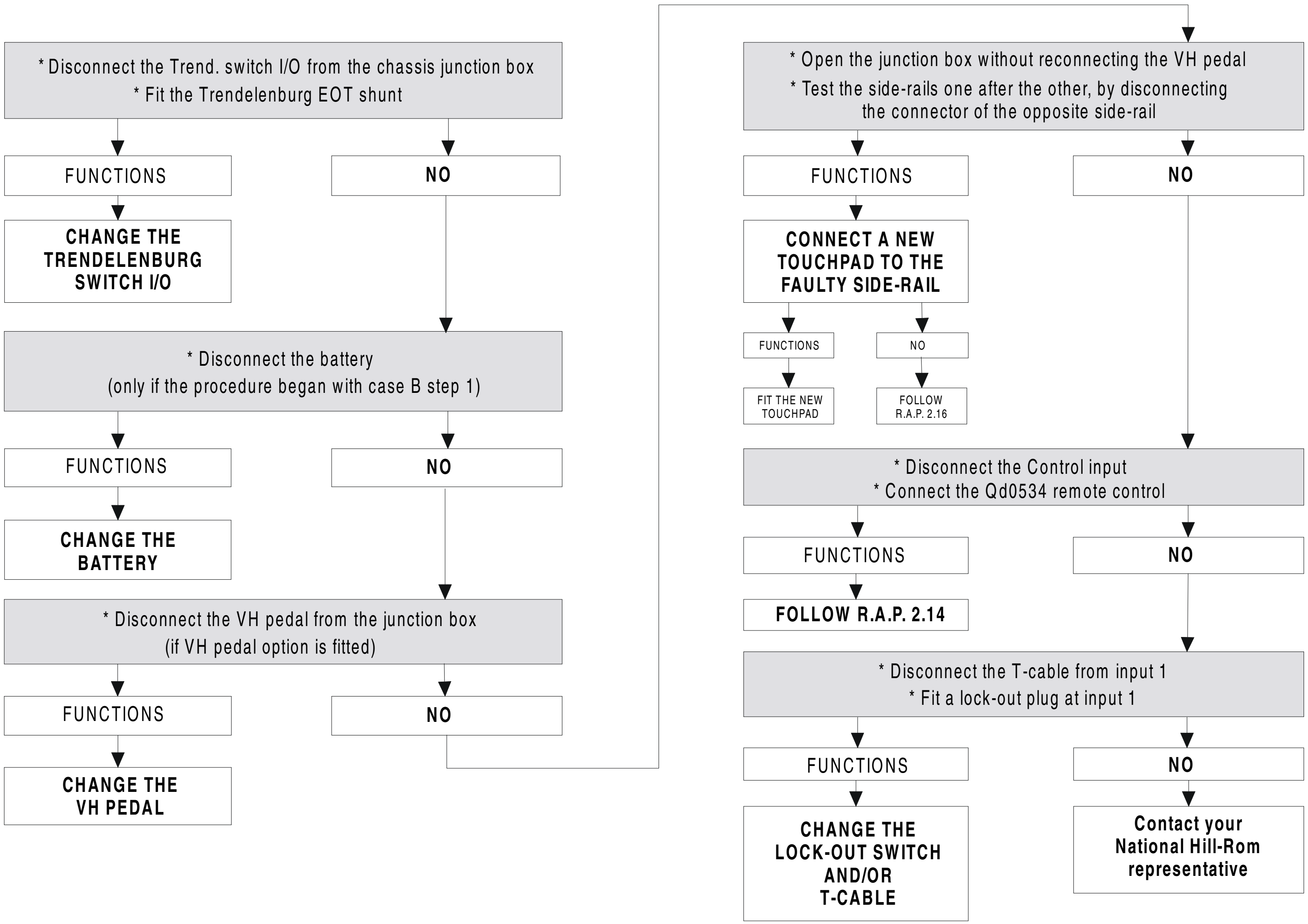
1512Atbl_208

Step 1


CASE A
NO MOVEMENT is possible
Disconnect the battery
FUNCTIONS
DOES NOT FUNCTION
CHANGE THE BATTERY
CHANGE THE CBO9UNIT
CASE B
AT LEAST ONE MOVEMENT is possible
Disconnect the faulty motor and replace it by another without attaching it
FUNCTIONS
DOES NOT FUNCTION
CHANGE THE MOTOR
CHANGE THE CB09 UNIT
Perform the battery charge test to confirm

1512_209.wmf

STEP 2


* Disconnect the Trend. switch I/O from the chassis junction box
* Fit the Trendelenburg EOT shunt
FUNCTIONS
NO
CHANGE THE TRENDELENBURG SWITCH I/O
* Disconnect the battery
(only if the procedure began with case B step 1)
FUNCTIONS
NO
CHANGE THE BATTERY
* Disconnect the VH pedal from the junction box
(if VH pedal option is fitted)
FUNCTIONS
NO
CHANGE THE VH PEDAL
* Open the junction box without reconnecting the VH pedal
* Test the side-rails one after the other, by disconnecting the connector of the opposite side-rail
FUNCTIONS
NO
CONNECT A NEW TOUCHPAD TO THE FAULTY SIDE-RAIL
FUNCTIONS
NO
FIT THE NEW TOUCHPAD
FOLLOW R.A.P. 2.16
* Disconnect the Control input
* Connect the Qd0534 remote control
FUNCTIONS
NO
FOLLOW R.A.P. 2.14
* Disconnect the T-cable from input 1
* Fit a lock-out plug at input 1
FUNCTIONS
NO
CHANGE THE LOCK-OUT SWITCH AND/OR T-CABLE
Contact your National Hill-Rom representative

1512_210.wmf

3. Theory of Operation

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General cabling and positioning of components - LI156Ex 3- 2

Schematic diagram for LI156Ex 3- 3

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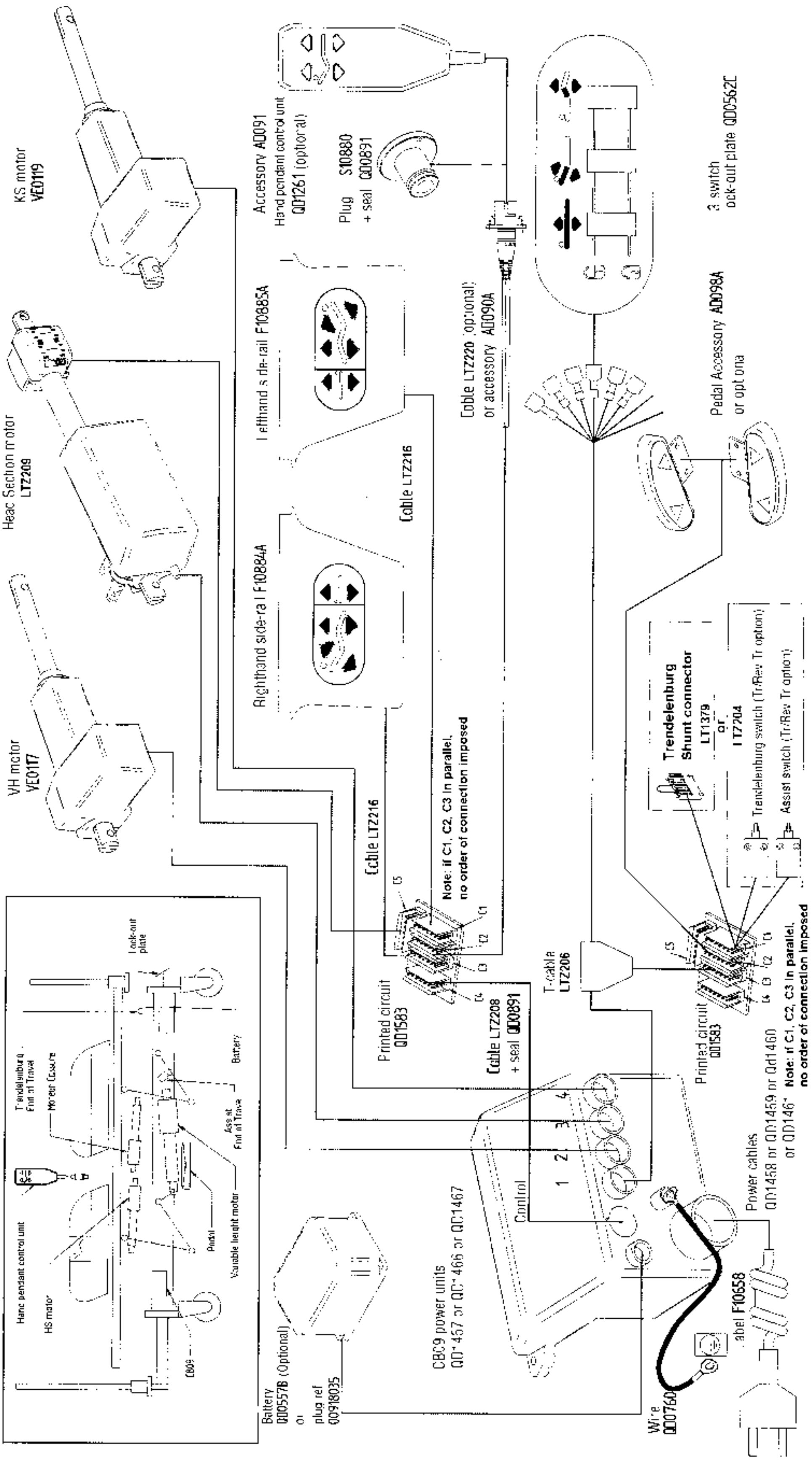
3.1.1 Mechanics.. 3- 4

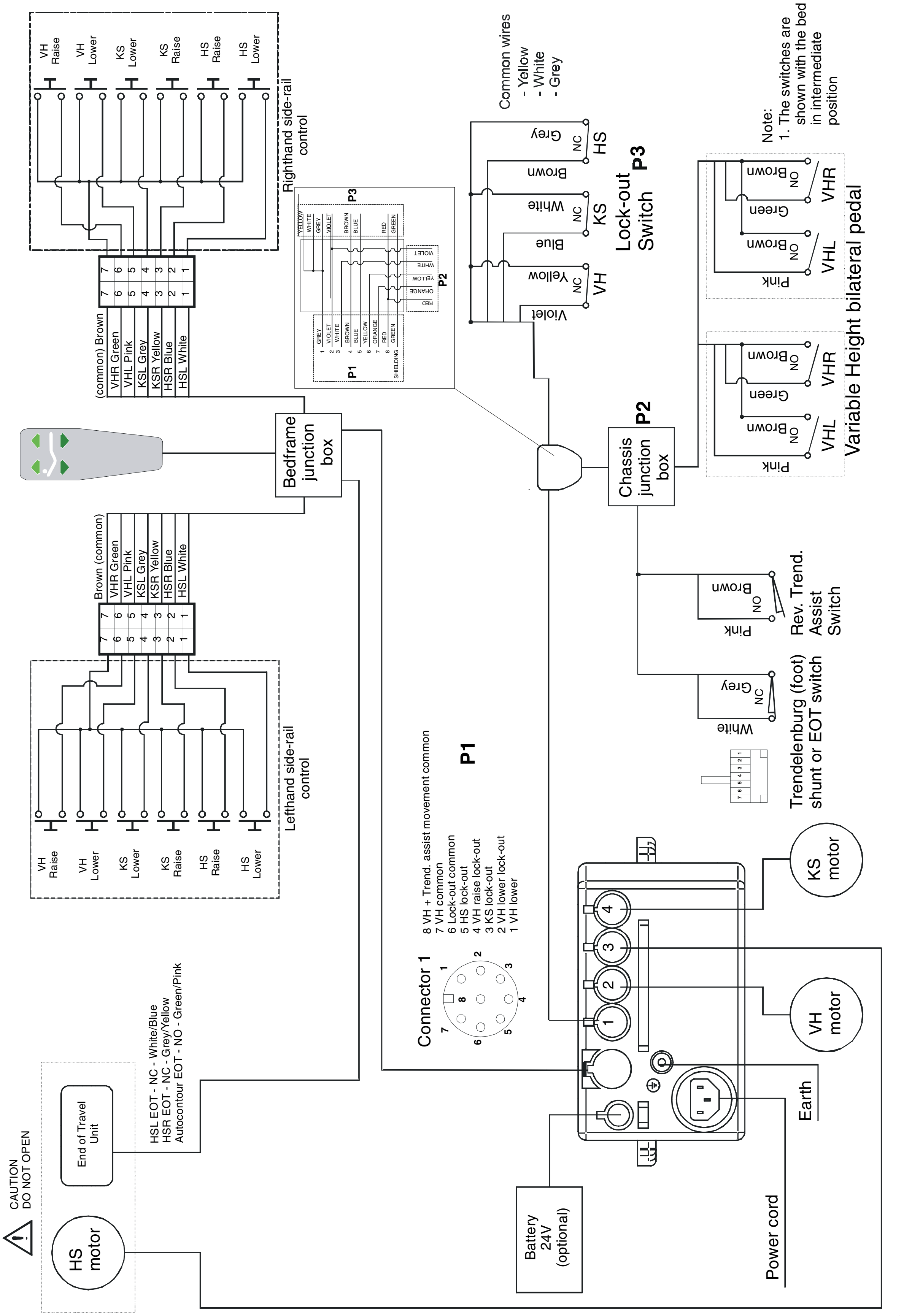
3.1.2 Electrics: Theory of Operation 3- 4

General cabling and positioning of components - LI156Ex


KS motor
VE0119
Accessory AD091
Hand pendant control unit
QD1261 (optional)
Plug S10880
+ seal QD0891
3 switch
lock-out plate QD0562C
Lefthand side-rail F10885A
Cable LTZ220 (optional)
or accessory AD090A
Pedal Accessory AD098A
or optional
Head Section motor
LTZ209
Cable LTZ216
VH motor
VE0117
Righthand side-rail F10884A
Trendelenburg
Shunt connector
LT1379
or
LTZ204
Trendelenburg switch (Tr/Rev Tr option)
Assist switch (Tr/Rev Tr option)
Cable LTZ216
Note: if C1, C2, C3 in parallel,
no order of connection imposed
C5
C1
C2
C3
C4
Printed circuit
QD1583
Cable LTZ208
+ seal QD0891
T-cable
LTZ206
C5
C1
C2
C3
C4
Printed circuit
QD1583
Note: if C1, C2, C3 in parallel,
no order of connection imposed
Power cables
QD1458 or QD1459 or QD1460
or QD1461
Control
1
2
3
4
CB09 power units
QD1457 or QD1466 or QD1467
Battery
QD0557B (Optional)
or
plug ref
QD918035
Wire
QD0760
Label F10658
Lock-out plate
Trendelenburg End of Travel
Motor Casing
Battery
Assist End of Travel
Hand pendant control unit
HS motor
Pedal
Variable height motor
CB09

1512_300.tif

Schematic diagram for LI156Ex


VH Raise
VH Lower
KS Lower
KS Raise
HS Raise
HS Lower
Righthand side-rail control
7 6 5 4 3 2 1
(common) Brown
VHR Green
VHL Pink
KSL Grey
KSR Yellow
HSR Blue
HSL White
Bedframe junction box
Brown (common)
VHR Green
VHL Pink
KSL Grey
KSR Yellow
HSR Blue
HSL White
Lefthand side-rail control
P3
YELLOW
WHITE
GREY
VIOLET
BROWN
BLUE
RED
GREEN
P2
VIOLET
WHITE
YELLOW
ORANGE
RED
P1
1 GREY
2 VIOLET
3 WHITE
4 BROWN
5 BLUE
6 YELLOW
7 ORANGE
8 RED
GREEN
SHIELDING
Common wires
- Yellow
- White
- Grey
Grey
NC
HS
Brown
White
NC
KS
Blue
Yellow
NC
VH
Violet
Lock-out Switch
P3
Note:
1. The switches are shown with the bed in intermediate position
Brown
NO
VHR
Green
Brown
NO
VHL
Pink
Variable Height bilateral pedal
Chassis junction box
P2
Brown
ON
Pink
Rev. Trend. Assist Switch
Grey
NC
White
Trendelenburg (foot) shunt or EOT switch
7 6 5 4 3 2 1
P1
8 VH + Trend. assist movement common
7 VH common
6 Lock-out common
5 HS lock-out
4 VH raise lock-out
3 KS lock-out
2 VH lower lock-out
1 VH lower
Connector 1
1 2 3 4 5 6 7 8
KS motor
VH motor
4
3
2
1
Earth
Power cord
Battery 24V (optional)
HSL EOT - NC - White/Blue
HSR EOT - NC - Grey/Yellow
Autocontour EOT - NO - Green/Pink
End of Travel Unit
CAUTION
DO NOT OPEN
HS motor

1512_301.wmf

3.1 Technical description

The operation of the Evolution LI156Ex bed can be divided into 2 categories or sub-systems:

- Mechanics
- Electrics

The interaction between these sub-systems allows all the operational functions to be used.

The electric functions are driven by low voltage motors.

Each of the sub-systems will be described separately in the following sections. The schematic diagrams are located at the beginning of this section.

3.1.1 Mechanics

The mechanical sub-system consists of two connected systems:

- Chassis - Bedframe

Trendelenburg/Reverse Trendelenburg

The Trendelenburg/Reverse Trendelenburg position is a mechanical and electrical function assisted by a gas spring. The operating principle is as follows:

The lift arms are linked by two notched sliding tubes. They are unlocked when the control lever is operated, thus allowing the bedframe in Trendelenburg or Reverse Trendelenburg mode to be inclined at the required position or maximum angle.

Trendelenburg accuracy: the maximum angle depends on the height of the sleep surface. It can only be obtained if this height is between 70 cm from the ground and the maximum height.

The lowering of the bedframe in Trendelenburg is stopped by a specific End-of-Travel (EOT) situated the foot section of the chassis. This EOT cuts off the Variable Height motor power, so that demands are not made on the structure of the bed.

Reverse Trendelenburg accuracy: This position has two types of operation:

- **electric**: when the height of the sleep surface is between 64 cm from the ground and the high position. When the bed is supplied from the mains or a battery (optional) and the control lever is operated while gently lifting the foot end, the sliding connection is released and the Variable Height actuator drops as the Reverse Trendelenburg microswitch closes. The headend of the bedframe drops electrically until the Reverse Trendelenburg control lever has been released, or the maximum angle reached.

- **mechanical**: when the height of the sleep surface is below 64 cm, the operation is the same as for the Trendelenburg position. This operating phase corresponds to the yellow area of the indicator on the bed lift arm.

CPR release

When the CPR function situated under the corner at either side of the head section is activated, it allows the driving gear of the Head Section situated inside the actuator to be disengaged. This allows the head section to drop under the pull of gravity, assisted/ cushioned by a gas spring.

Construction of side-rails

The side-rails have a welded structure consisting of upper frames, pivoting arms and assembly connections. In this way they form a solid unit.

Head and foot boards

The head and footboards feature an injected/blow-moulded plastic structure with painted steel clasps for assembly and decorative laminated panels.

Bedside Cabinet Transport

A bed featuring the "Bedside Cabinet Transport" option comprises a mechanical welded chassis without symmetrical headboard (SH) and an intermediate mechanical welded structure integrating the horizontal symmetrical headboard (HSH). At the head of this HSH frame, the bedside cabinet support consists of 2 plastic rails assembled with screws.

3.1.2 Electrics: Theory of Operation

The specifications of the bed are as follows:

Class	I IPX4 type B
Voltages	220V(-10%)-240V(+6%) or 110V-120V (+/-10%) or 100V +/-10% AC Voltages + Ground
Frequency	50-60Hz
Maximum power load/ Amperage	320VA/1.25 A or 2.5A or 3.15A according to country.

1512Atbl_300

Refer to the schematic diagrams at the beginning of the section for specific information relative to cabling.

The bed is operated with a CB09 power unit. This unit controls the electrical functions of the bed: Variable Height, Head Section and Knee Section with autocontour.

These functions are performed by motors using very low continuous security voltages.

Power unit characteristics

Class	II IP54
Supply voltage	220V(-10%)-240V(+6%) or 110V-120V (+/-10%) or 100V +/-10% AC Voltages + Ground
Frequency	50-60Hz
Fuse circuit-breaker on primary	1.25A (version 220/240v) 2.5A (version 110/120v) 3.15A (version 100v)
Maximum power load/ Amperage	320VA/1.25A or 2.5A or 3.15 A according to country
Output voltage	24 to 45V DC
Output power	160VA
Intermittent operation	10% 6 min/hour

1512Atbl_301

The CB09 unit comprises three sections:

1 - power stage

2 - functions controlled by relays

3 - battery charging circuit.

1 - Depending on the use of the bed, the power stage is composed of a 230V/38VAC, 120V/38VAC or 100V/ 38VAC transformer, protected at the input by 2 time delay fuses of 1.25A, 2.5A or 3.15A depending on configuration, followed at the output by a floating power stage whose main component is an FET transistor. At its input, this floating stage has rectifier diodes and at its output, the filtering capacitor. It supplies an output DC voltage adapted to the power required. This voltage varies between 24V and 45VDC according to the functions activated.

A current limiting circuit also controls power supply cut-off via a second FET transistor if the load lifted by the bed is greater than 250kg.

2 - The relays are controlled by transistors. In order to protect these relays from arcing during switching, the second FET transistor checks the power cycle when a function is activated, thus allowing the relays to close with no voltage. In the same way, when a function control is released, the FET transistor cuts the power before the relay contact opens.

Autocontour: the unit controls the operation of the bed in Autocontour mode (Head Section and Knee Section) via the intermediate End Of Travels of the Head Section (external EOT fitted to the body of the motor) and Knee Section (EOT internal to the motor) motors.

3 - The bed can be fitted with a battery. This battery is external to the power unit. The battery charging circuit of the CB09 has current limiting according to the level of the battery. Charging begins as soon as the voltage is switched on and lasts 12 hours if the battery is fully discharged (from the audible signal).

When the CB09 unit is not connected to the mains supply, checking the voltage level enables a “low battery power” audible signal to be set off by buzzer when the voltage lies between 18V and 15V. This is an audible beep that sounds when a switch is pressed.

The functions are activated by the side-rail controls of the hand pendant control unit (accessory) or the Variable Height pedal (optional or accessory) after each function has been electrically unlocked.

Battery characteristics

Input/Output voltage	24 VDC
Class	II IP65
Maximum charging time	12 hours
Discharging time (storage)	3 months

1512Atbl_302

This is a Lead Acid battery, comprising 2 components of 12V, 1.2Ah connected to each other by a 10A fuse.

This battery model has no memory effect and can thus be recharged regularly without any particular constraints.

Explanation of the memory effect: some types of batteries must be fully discharged before being recharged. Disregarding this precaution significantly reduces their lifetime.

Capacity of the battery after full charging (12 hours): minimum of 4 complete VH, HS and KS raise lower cycles with a safe working load on the bed (170 kg), before the low battery alarm is given.

Motor characteristics

The motors have the following characteristics:

	VH	HS	KS
Manufact.	LINAK	LINAK	LINAK
Reference	LA31.40BM	LA32.50F	LA31.1
Class	II IP54	II IP65	II IP54
Power	144 W	100 W	65 W
Voltage	24 to 45 V DC	24 to 45 V DC	24 to 45 V DC
Intermittent service	10% max. 6 min./hour	10% max. 6 min./hour	10% max. 1 min./hour

1512_tbl_303

The dimensions are as follows:

Variable Height

- 195mm (7.68") actuator travel
- 415mm (16.34") rod, retracted centre to centre

Head Section

- 190 mm (7.48") actuator travel
- 455 mm (17.91") rod, retracted centre to centre

Knee Section

- 60 mm (2.36") actuator travel
- 295 mm (11.61") rod, retracted centre to centre

The motors contain the internal upper and lower End of Travels (for HS motor: the end of travel unit is external, but fixed to the motor) that allow the power unit to cut the power in these positions. For the Trendelenburg position, an NC (Normally Closed) End of Travel stops the sleep surface in its lower position so that the bed chassis is not used. The problem does not apply to Reverse Trandelenburg due to the design of the chassis.

An NO (Normally Open) Reverse Trendelenburg assist switch comes into operation when this function is activated so as to lower the bed automatically.

Autocontour function: this function is carried out by two intermediate end of travel switches that are internal to the Knee Section and Head Section motors (for HS motor: the end of travel unit is external, but fixed to the motor). When the Head Section "Raise" function is activated with the bed horizontal, the HS and KS sections rise simultaneously until the internal intermediate EOT switch of the KS motor cuts the power at an angle of 16°. The HS motor still operates until its upper EOT is reached or the control is released. When the Head Section "lower" function is activated and the corresponding section reaches an angle of 22°, the intermediate EOT of the HS motor controls the KS motor as the section lowers. If the inclination of the HS is small to begin with, the KS will lower immediately.

Note: Abbreviations: refer to Section 1.

Note: The guarantee will become null and void if any electric part is opened.

Notes:

4. Removal, Replacement and Adjustment Procedures

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Notes

4.1) Side-rail touchpad replacement

Tools required: 1 small flat blade screwdriver
1 med. Phillips head screwdriver
1 x 3mm Allen key
1 mallet

Removal

1. Apply the brakes, adjust the bed to its high position, then put the Head Section in the horizontal position and the relevant side-rail to high position.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Use the small flat blade screwdriver and the mallet to pierce the centre, remove and throw away the three caps (A) of the side-rail bar then the four touchpad caps (B) (see figure 1).

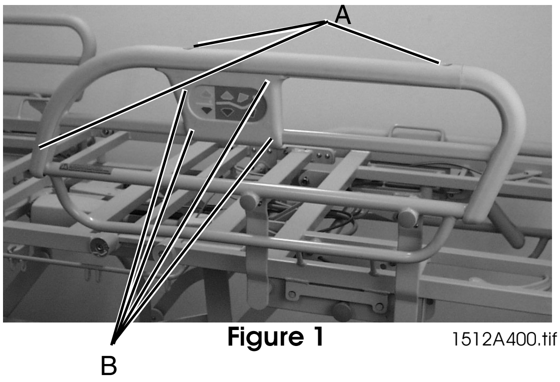


Figure 1 1512A400.tif

4. Unscrew the three screws of the bar using the 3mm Allen key and remove the bar by lifting it up at the headend of the bed (C) (see figure 2).

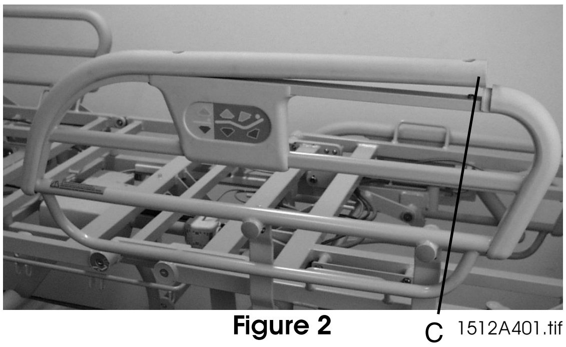


Figure 2 1512A401.tif

5. Unscrew the four screws (D) of the touchpad using the medium Phillips head screwdriver (see figure 3).

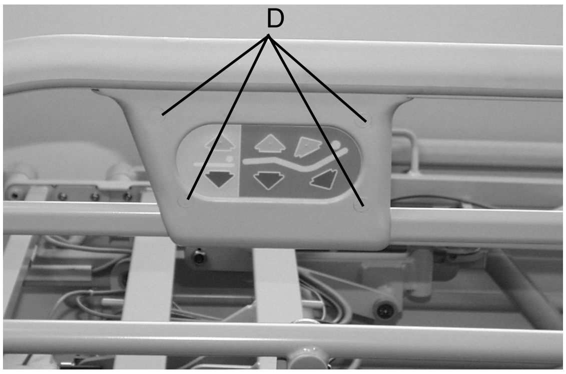


Figure 3 1512A402.tif

6. Open out the touchpad and remove the adhesive waterproof sleeving (E) from the connector (see figure 4).

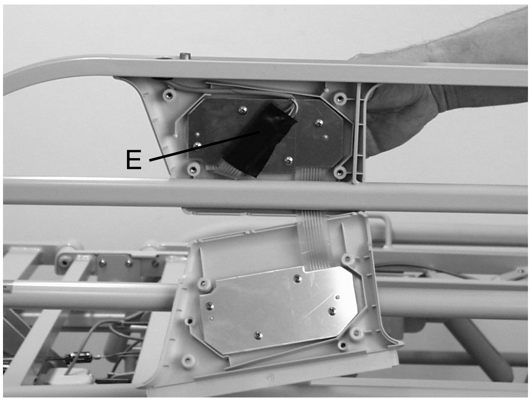


Figure 4 1512A403.tif

7. Disconnect the touchpad and remove it from the bed while keeping the intermediate connector attached to the cable.

Installation

1. Perform the removal procedure in reverse order, replacing the adhesive waterproof sleeving, being careful not to damage the cable and positioning the touchpad unit correctly on the side-rail guide marks.
2. Replace the seven used caps.
3. Perform the "Function Checks" on page 2-3 of this manual.

4.2) Side-rail cable replacement

Tools required: 1 mallet
1 med. Phillips head screwdriver
1 small flat blade screwdriver
1 x 3mm Allen key
1 wire tie cutter
1 electrician's knife
1 tube of medical grease
1 small cross-section rigid electric wire (1.4m).
1 Seritech: ref: OUZ001 (supplier: Nicom, ref :T050-101-01) touchpad connector clip

Removal

1. Adjust the bed to its high position, the Head Section and the Knee Section to the low position, then remove the bedframe's hard surfaces.
2. Raise the side-rails.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

4. With the medium Phillips head screwdriver, unscrew the two screws securing the plastic cover of the relevant side-rail arm and remove it.
5. With the small flat blade screwdriver and the mallet, pierce the centre, remove and throw away the 4 caps of the side-rail bars then the four touchpad caps.
6. Position the Head Section using the CPR control.
7. Unscrew the 4 screws of the bars with the 3mm Allen key and remove them by first lifting the longest bar where it joins the other.
8. Unscrew the four screws of the touchpad with the medium Phillips head screwdriver and open out the touchpad.
9. Cut the cable wiring harness at the connector, and recover the touchpad unit.
10. Remove the adhesive waterproof sleeving from the connectors.

11. Recover the intermediate connector.
12. Tie the wire at the end of the cut cable. The cable can also be stripped and spliced directly to the wires.
13. Slide the cable so that it comes out with the first wire at the end of the side-rail at P (see figure 1)

    Note: the end of the wire must come out at the touchpad at R (see figure 1).

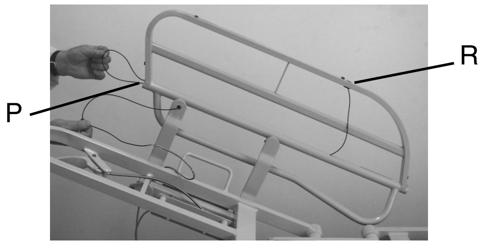


Figure 1 1512A404.tif

14. Remove the cable from the upper articulation of the side-rail, on the inner side of the bed (at S, see figure 2).

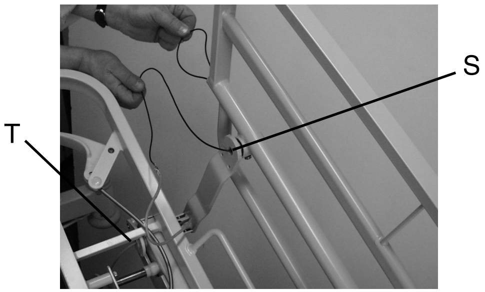


Figure 2 1512A405.tif

15. Disconnect the wire and leave it inside the side-rail.
16. Pull out the cable from the lower articulation of the side-rail (at T, see figure 2).
17. Pull out the cable from the junction box inlet, located in the middle section of the bedframe, and the plastic conduit.

    Note: medical grease is used to run the cables when they are being fitted.
18. With the wire tie cutter, cut the wire ties that hold the cable at the inlet of the junction box.
19. With the 3mm Allen key, unscrew the two screws that secure the junction box to the bedframe and separate the junction box from the bedframe crossbar (see figure 3). Recover the washers.

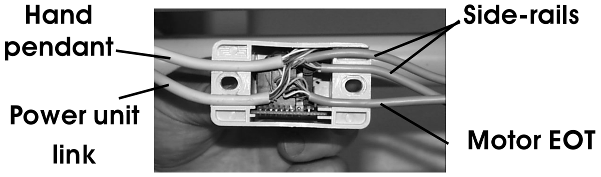


Figure 3 1512A407.tif

20. Push the cables out from the junction box, and remove the printed circuit.
21. Unplug the connector of the cable to be replaced from the printed circuit.

Installation

Note: this procedure uses the side-rail cable replacement kit listed in Section 5.

1. Fit the connector equipped with the new cable to the printed circuit at C1, C2 or C3 (depending on availability) (see figure 4).

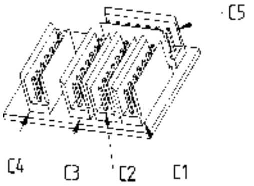
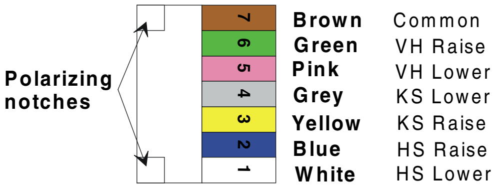


Figure 4 1512A406.tif

2. Perform steps 21 to 16 of the removal procedure in reverse order, respecting the position of the cables in the junction box (see figure 3).
3. With the electrician's knife, strip the end of the cable to 5cm.
4. Attach the side-rail cable wires to the guide wire at S (see figure 2).
5. Slide the cable into the side-rail until it comes out at R (see figure 1), and remove the guide wire.
6. With the touchpad connector clip, connect the cable wires to the kit connector making sure that the colours are correctly matched (see figure 5).



7	**Brown**	Common
6	**Green**	VH Raise
5	**Pink**	VH Lower
4	**Grey**	KS Lower
3	**Yellow**	KS Raise
2	**Blue**	HS Raise
1	**White**	HS Lower

Side-rail circuit connector

Figure 5 1512_206.tif

7. Perform steps 11 to 1 of the removal procedure in reverse order by replacing the adhesive waterproof sleeving. Be careful not to damage the cable and position the touchpad unit with respect to the side-rail guides.
8. Replace the seven used caps.
9. Perform the "Function Checks" on page 2-3 of this manual.

4.3) Intermediate side-rail cable replacement

This concerns the cable between the power unit and the bedframe junction box.

Tools required: 1 small flat blade screwdriver
1 x 3mm Allen key
1 wire tie cutter
1 electrician's knife
1 tube of medical grease
1 Seritech: ref: OUZ001
(supplier: Nicom, ref :T050-101-01)
touchpad connector clip

Removal

1. Apply the brakes, adjust the bed to its high position if possible, then adjust the Head Section and Knee Section to the horizontal position and remove the hard surfaces of the bedframe.
2. Put the side-rails in the high position.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

4. With the 3mm Allen key, unscrew the two screws securing the junction box to the bedframe and separate the junction box from the bedframe crossbar (see figure 1). Recover the washers.

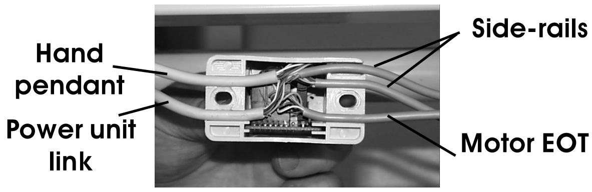


Figure 1 1512A407.tif

5. Push the cables out from the junction box and remove the printed circuit.
6. Unplug the connector of the cable to be replaced from the printed circuit: marking C4 (see figure 2).

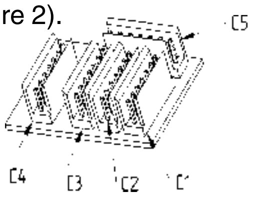


Figure 2 1512A406.tif

7. With the small flat blade screwdriver, open out the bedframe cable track that runs the cable up to the split conduit.
8. With the wire tie cutter, cut both the ties securing the intermediate and Knee Section motor cables to the bedframe crossbar.
9. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed.
10. Remove the headend cover and place the footend cover on its side.
11. With the small flat blade screwdriver, unlock and remove the catch of the cables connected to the power unit.
12. Unplug the intermediate cable connector from the power unit, input (C) (see figure 3).

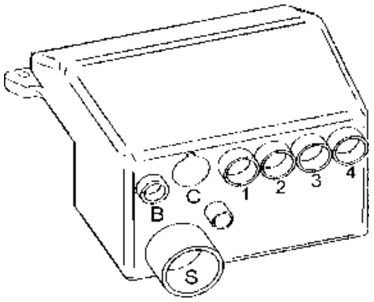


Figure 3 1512A200.tif

13. Cut the wire ties securing the intermediate cable on the chassis.
14. With the 3mm Allen key, unscrew both the clamps securing the split conduit.
15. Remove the intermediate cable from the conduit. Note that the conduit groove must be oriented towards the headend section of the bed.

Installation

1. Perform the removal procedure in reverse order.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.4) Power supply cable replacement

Important: only the power supply cable listed in Section 5 may be installed on the LI156Ex bed. Other cables may reduce the safety and compliance of the bed.

Tools required: 1 short Phillips head screwdriver
1 small flat blade screwdriver
1 x 3mm Allen key

Removal

1. Apply the brakes and adjust the bed to its high position.
2. Adjust the Head Section to high position.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

4. With the 3mm Allen key, remove the three screws (A) securing the headend cover of the bed (see figure 1). Recover the washers.

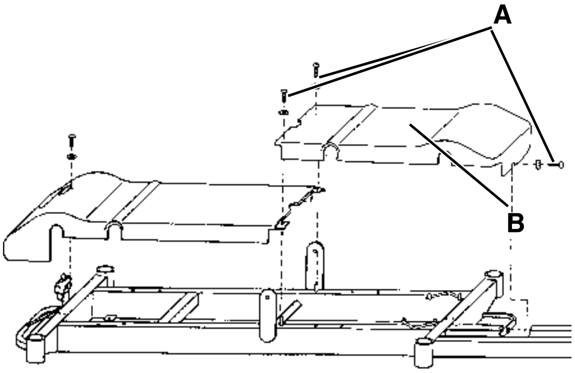


Figure 1 1512A408.tif

5. Remove the headend cover B (figure 1).
6. With the short Phillips head screwdriver, remove the two screws securing the power cable strain relief system under the chassis.
7. With the small flat blade screwdriver, unlock and remove the mains plug of the power unit. Do this by pushing in the pins above and below the power unit (see figure 2) and pull out the connector while tilting it in the opposite direction to the screwdriver.

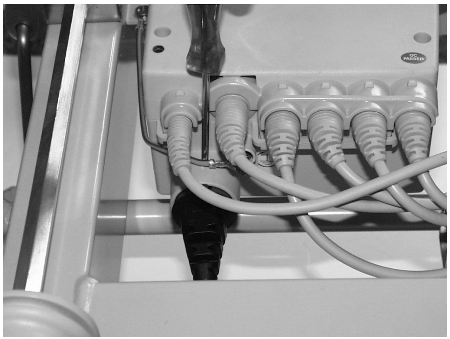


Figure 2 1512A409.tif

Installation

1. Perform the removal procedure in reverse order.

   Note: the earth terminal of the mains plug is located in the middle of the plug, and must be facing downwards when fitting the cable.

   An audible "click" should also be heard when locking the plug into the power unit.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.5) Power unit replacement

Tools required: 1 small flat blade screwdriver
1 x 3mm Allen key
1 x 7mm open end wrench

Removal: Specific procedure when bed is stuck in low position.

a. Lay the Head Section and Knee Section flat, and remove the hard surfaces from the bedframe.

b. Raise the side-rails.

c. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

d. Turn the lefthand castors of the bed inwards (taking the lefthand side to be when lying on the bed) and apply the brakes.

e. After laying a protective sheet on the floor, turn the bed onto its lefthand side.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

Note: **this procedure can be carried out with the bed on its castors, but is not very easy.**

f. With the small flat blade screwdriver, unlock then unplug the mains plug from the power unit by pressing the locking pin under the connection (small opening provided). Note: the upper pin is not accessible, but the plug can still be unplugged.

g. With the small flat blade screwdriver, unlock and remove the catch holding the connectors to the power unit.

h. Unplug all the connectors B, C,1 and 2 of the power unit (see figure 1).

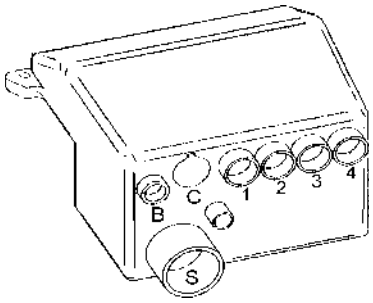


Figure 1 1512A200.tif

i. With the 7mm open end wrench, free the ground wire of the power unit.

j. Position the replacement unit, without fixing it, so that the four removed connectors can be plugged in. Make sure the positions are correct (see table 1).

	LI156Ex BED
S	MAINS POWER CABLE
B	BATTERY
C	CONTROL
1	T-CABLE: LOCK-OUT, VARIABLE HEIGHT PEDAL, Tr./Rev.Tr. I/O SWITCHES
2	VARIABLE HEIGHT MOTOR
3	HEAD SECTION MOTOR
4	KNEE SECTION MOTOR

1512_tbl_200

Table 1

k. Plug the bed into its power source again, or put the lock-out switches to the “unlocked” position (padlock open) if the bed has a battery.

l. Operate the Variable Height Motor function to bring the bed to its mid-position at least. Note: support the bed during this movement so as not to damage the bedframe or chassis.

m. Unplug the bed from its power source again. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

n. Disconnect the replacement power unit.

o. Lift the bed up onto the castors.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

p. Continue the standard procedure from step 3 (following page).

Removal: general procedure

1. Apply the brakes, then adjust the sleep surface and the Head Section to the high position. Remove the bedframe hard surfaces, then raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. With the 3mm Allen key, unscrew and remove the three screws securing the headend cover of the bed. Recover the washers.
4. Remove the headend cover of the bed.
5. With the small flat blade screwdriver, unlock and remove the mains plug of the power unit. Do this by pushing in the pins above and below the power unit (see figure 2) and pull out the connector while tilting it in the opposite direction to the screwdriver.

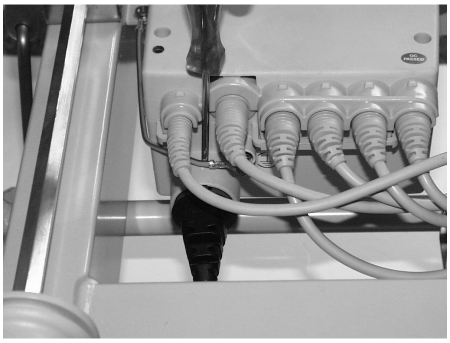


Figure 2 1512A409.tif

6. With the small flat blade screwdriver, remove the catch holding the connectors to the power unit.
7. Remove all the power unit connectors.
8. With the 7mm open end wrench, remove the screw fixing the ground wire to the power unit and free the wire.
9. With the 3mm Allen key, remove the 2 screws fixing the power unit to the chassis while supporting it and then remove the unit from the bed. Recover the two screws and washers.

Installation: general procedure

1. Perform the removal procedure in reverse order.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.6) Lock-out switch replacement

Tools required: 1 x 3mm Allen key
1 wire tie cutter
1 needle nosed pliers

Removal

1. Apply the brakes, adjust the bed to its high position, then raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. With the 3mm Allen key, unscrew and remove the three screws securing the footend cover of the bed. Recover the screws and washers.
4. Pull the footend cover and tip it carefully onto the side of the bed.
5. If necessary, use the the wire tie cutter to cut the tie securing the lock-out cable to the chassis so as to free the cable.
6. With the needle nosed pliers, unplug the connectors of the switch to be replaced.
7. Manually press both catches of the faulty switch and remove it from its housing.

Installation

1. Perform the removal procedure in reverse order, ensuring that the switch position corresponds to the "locked out" (padlock closed) and "unlocked" (padlock open) functions. Ensure that the wires are properly connected per function (see table 1), and replace the used wire tie if necessary.

Functions	Wire colours
Variable Height	Violet and yellow
Head Section	Grey and brown
Knee Section	Blue and white

1512_tbl_400

Table 1

2. Perform the "Function Checks" on page 2-3 of this manual.

4.7) Battery replacement

Tools required: 1 small flat blade screwdriver
1 x 3mm Allen key
1 x 8mm open end wrench
1 wire tie cutter

Removal

1. Apply the brakes, adjust the bed to its high position, then raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.
4. Remove the headend cover of the bed.
5. Tilt the footend cover of the bed onto its side.
6. With the small flat blade screwdriver, unlock and remove the catch securing the connectors to the power unit.
7. Unplug the battery connector B (see figure 1).

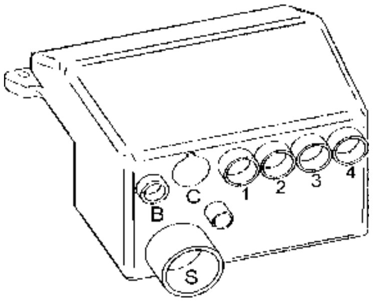


Figure 1 1512A200.tif

8. With the wire tie cutter, cut the wire ties securing the battery cable to the other cables and the chassis up to the power unit.
9. With the 3mm Allen key and the 8mm open end wrench, unscrew and remove the four screws securing the battery to its supports.
10. Remove the battery.

Installation

1. Perform the removal procedure in reverse order, replacing the wire ties and the four battery attachment nuts (lock nuts).
2. Perform the "Function Checks" on page 2-3 of this manual.

4.8) Variable Height motor replacement

Tools required: 1 small flat blade screwdriver
1 x 3mm Allen key
1 x 13mm open end wrench
1 wire tie cutter
1 multigrip pliers
1 mallet
1 x 8 or 10 mm diameter pin-punch
1 torque wrench
1 x 3m sling with ratchet

Removal

1. Adjust the Head Section and Knee Section of the bed to the low position. If possible, raise the bedframe to the intermediate position, then remove the bedframe's hard surfaces.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Raise the side-rails.
4. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers
5. Remove the headend cover of the bed.
6. Tip the footend cover of the bed on its side as far as possible.
7. With the small flat blade screwdriver, remove the catch securing the various connectors connected to the power unit.
8. With the wire tie cutter, cut the wire ties securing the different cables to the chassis up to the power unit.
9. Unplug connector 2 from the power unit (see figure 1) and separate the relevant cable.

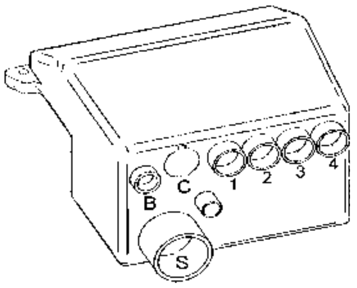


Figure 1 1512A200.tif

10. With the 13mm open end wrench, unblock both the nuts (A) securing the motor support assembly (B) (see figure 2).

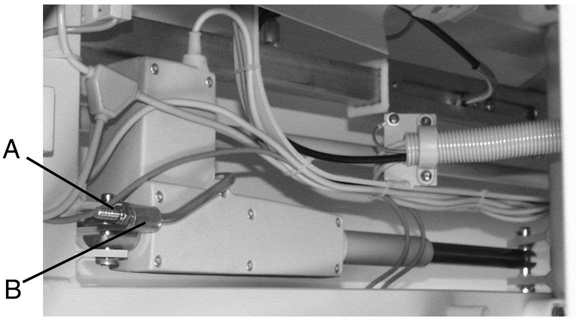


Figure 2 1512A410.tif

11. Beds with Trendlenburg/Reverse Trendelenburg only: if the bedframe is not in the intermediate position: with the 3mm Allen key, unscrew both screws securing the Reverse Trendelenburg assist switch (located near the VH motor body) and free the switch. Recover both metal spacers.
12. Turn the castors on the righthand side of the bed inwards toward the chassis (the viewpoint of a patient lying on the bed must be used), and apply the brakes.
13. Tip the bed onto its righthand side.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

14. Beds with Trendlenburg/Reverse Trendelenburg only: With the sling, attach the bedframe securely to the chassis to prevent the bed from opening out when the Variable Height motor is removed (see figure 3).

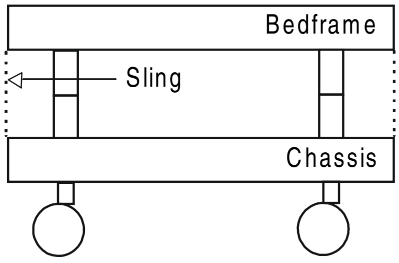


Figure 3 1512_411.wmf

WARNING

The strap must be attached securely. Failure to do so could result in personal injury.

15. Remove both Truarc circlips from the pin at the end of the motor rod.

    Note: the Truarc circlip next to the pin with two grooves is always placed on the inside groove.
16. Remove pin (C) located at the end of the motor rod (see figure 4). You can use the mallet and the pin-punch, or the multigrip pliers.

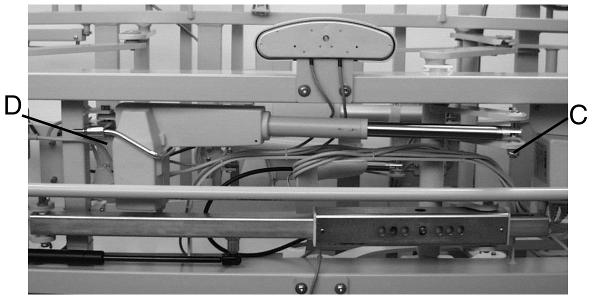


Figure 4 1512A412.tif

17. Recover both pin guide shouldered bushes (C).
18. With a small flat blade screwdriver, remove the upper Truac circlip of the pin (D) supporting the motor (see figure 4).
19. Remove the pin (D) while supporting the motor (see figure 4).
20. Remove the motor.
21. With the 13mm open end wrench, remove both nuts (A) fixing the motor support assembly (B) and extract this assembly from the motor (see figure 2).

Removal: Specific procedure when bed is stuck in low position and the covers cannot be unscrewed and removed

a. Adjust the Head Section and Knee Section of the bed to the low position and remove the hard surfaces from the bedframe.

b. Raise the side-rails.

c. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

d. Turn the castors on the righthand side of the bed inwards toward the chassis (the viewpoint of a patient lying on the bed must be used), and apply the brakes.

e. LI156Ex beds with Trendelenburg/Reverse Trendelenburg only: Operate the Trend./Rev. Trend. lever of the bed so that the bed attains maximum Reverse Trendelenburg even if the tilt is not large, since this decompresses the Trendelenburg/Reverse Trendelenburg assist gas spring.

f. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.

g. After placing a protective cover on the ground, tip the bed onto its righthand side.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

h. Beds with Trendelenburg/Reverse Trendelenburg only: with the sling, securely attach the bedframe to the chassis in the middle of the bed, while applying pressure, to prevent the bed from opening when the Variable Height motor is uncoupled (see figure 5).

Note: the sling compensates for the forces on the VH motor pins.

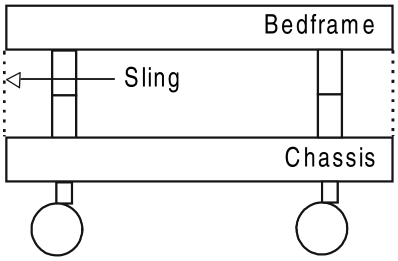


Figure 5 1512_411.wmf

WARNING

The strap must be attached securely. Failure to do so could result in personal injury.

i. Remove both the Truarc circlips from the pin located at the end of the motor rod.

Note: the Truarc circlip next to the pin with two grooves is always placed on the inside groove.

j. With the mallet and the pin-punch or the multigrip pliers, remove the pin at the end of the motor.

k. Recover both shouldered bushes from the motor end supports.

l. LI156Ex beds with Trendelenburg/Reverse Trendelenburg only: without removing the sling, operate the Trendlenburg lever of the bed so that the bedframe is parallel to the chassis.

m. LI156Ex beds with Trendelenburg/Reverse Trendelenburg only: manually move the bedframe apart from the chassis to access to the screws of the headend cover.

n. Remove the headend cover of the bed.

o. Tip the footend cover of the bed on its side as far as possible.

p. With the small flat blade screwdriver, remove the catch securing the connectors to the power unit.

q. With the wire tie cutter, cut the wire ties securing the various cables of the chassis up to the power unit.

r. Unplug connector 2 from the power unit (see figure 1).

s. With the 13mm open end wrench, partially loosen both the nuts of the motor support assembly (B) (see figure 2).

t. Remove one of the Truac circlips from the pin supporting the motor body.

u. Remove the pin (D) attaching the motor body while supporting the motor body (see figure 4).

v. Remove the motor and leave the sling in place.

w. Fully unscrew the nuts securing the motor assembly (B) (see figure 2) and remove the assembly from the motor.

Installation: for all beds

1. Install the motor support assembly (B) (see figure 2) on the new motor, and replace the locknuts (A) without tightening them.
2. Insert the base of the new motor into the correct position in the bedframe (see figure 4) and insert the pin (D) into its slot.
3. Fit the second Truarc circlip to the pin (D) (see figure 4).
4. Plug the connector of the new motor into input 2 of the power unit without attaching the cable (see figure 1).
5. Set the lock-out switch of the Variable Height function to the “unlocked” position (padlock open).
6. Switch on the power supply of the bed, but not if the bed is equipped with a battery.
7. Adjust the bed to a small Reverse Trendelenburg position, but not if the bed is blocked in the low position.
8. Press the Variable Height raise buttons on one of the side-rails to bring the tip of the motor rod to the two arms on the bedframe.
9. Fit the two shouldered bushes to the end of the two arms.
10. Fit pin (C) (see figure 4). The raise and lower buttons of the Variable Height function can be used to make installation easier.

    Note: the end of the pin with two grooves must point inwards to the chassis.
11. Fit the Truarc circlips at the end of the pin (C) (see figure 4). For the end with two grooves, fit the Truarc circlip on the inside groove.
12. Beds with Trendelenburg/Reverse Trendelenburg: remove the sling.
13. Stand the bed back on its wheels.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

14. With the 3mm Allen key, replace the Reverse Trendelenburg assist switch if it has been removed. Do not forget the metal spacers.
15. If the bed is not in the high position, do this by pressing the Variable Height raise button on one of the side-rails.
16. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).
17. Unplug the new Variable Height motor from the power unit.
18. Perform steps 11 to 1 of the removal procedure in reverse order replacing the used cable ties. Make sure that the headend and footend cover slots are correctly positioned on the chassis.

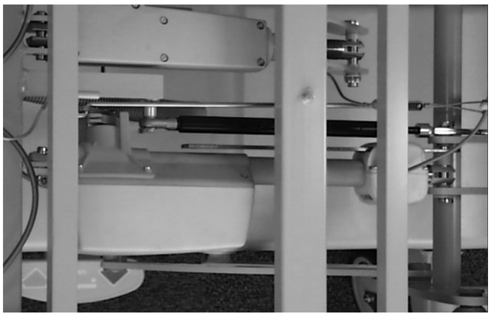
    Note: both of the locknuts (A) (see figure 2) must be tightened to a torque of 7Nm with the torque wrench.
19. Perform the "Function Checks" on page 2-3 of this manual.

4.9) Head Section motor replacement

Tools required:
1 med. Phillips head screwdriver
1 medium flat blade screwdriver
1 small flat blade screwdriver
1 x 3mm Allen key
1 x 4mm Allen key
1 wire tie cutter

Removal

Arrangement:



1512A413.tif

1. Apply the brakes, adjust the bed to its high position, the Knee Section and if possible the Head Section flat (use the CPR release if necessary), then remove the bedframe's hard surfaces.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Raise the side-rails.
4. With the 3mm Allen key unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.
5. Remove the headend cover of the bed.
6. Tilt the footend cover of the bed onto its side.
7. With the small flat blade screwdriver remove catch securing the connectors to the power unit.
8. With the wire tie cutter, cut the wire ties securing the various cables to the chassis between the power unit and the split conduit.
9. Unplug connector 3 from the power unit (see figure 1).

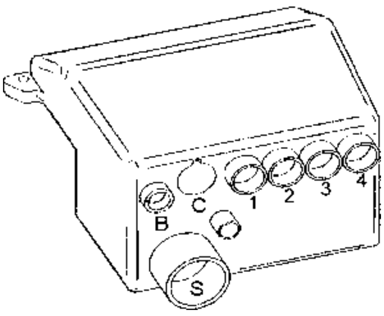


Figure 1 1512A200.tif

10. With the wire tie cutter, cut the wire tie securing the Head Section motor at the outlet of the split conduit (A) (see figure 2).

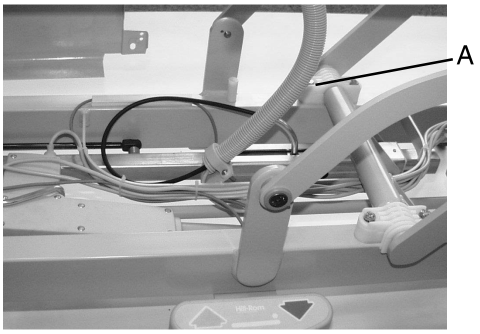


Figure 2 1512A414.tif

11. With the 3mm Allen key, unscrew the four screws securing the jumpers of the split conduit.
12. Remove the Head Section motor cable from the split conduit. Note that when subsequently reassembling the conduit, the conduit slot is turned upwards to the head of the bed. This is to prevent any noise when the bed is functioning.
13. Operate the lever on the Head Section CPR release and adjust the Section to the high position if possible.
14. With the 3mm Allen key, unscrew the screws securing the bedframe junction box, located under the Head Section crossbar of the bed. Recover the washers. Note the position of the cables (see figure 3).

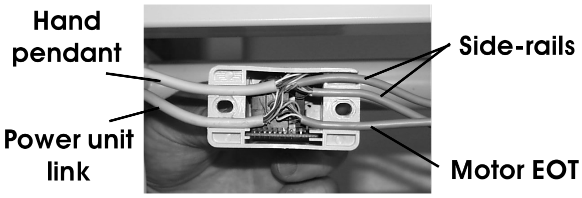


Figure 3 1512A407.tif

15. Remove the printed circuit from the junction box then cut the wire tie securing the cable to the end of travel unit to the side-rail cables, using the wire tie cutter (see figure 4).

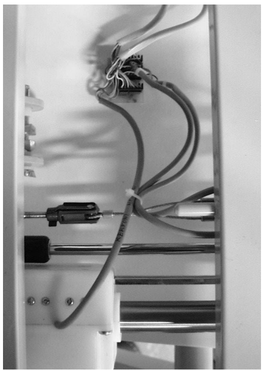


Figure 4 1512A415.tif

16. Disconnect the end of travel unit from the printed circuit: connected at C5 (see figure 5).

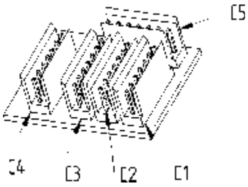


Figure 5 1512A406.tif

17. Lower the side-rails.
18. Remove the Truarc circlips (B) from the pin located at the end of the motor rod next to the actuator, and recover the plastic spacer (H) (see figure 6).

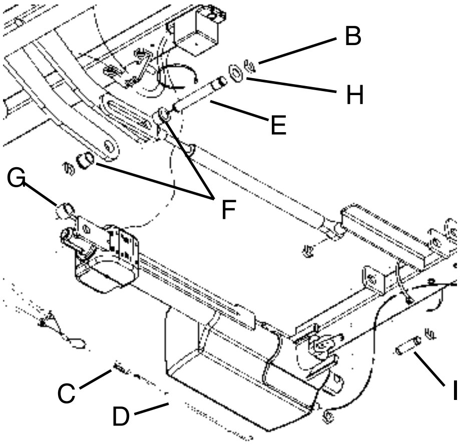


Figure 6 1512A416.tif

19. Move the actuator in order to free the motor end pin.

WARNING

If for any reason the Head Section cannot be adjusted to its high position, care must be taken when freeing the actuator because it is under constant pressure. Failure to do so could result in personal injury.

20. Operate the lever on the Head Section CPR release and adjust the Section to low position if possible.
21. Unclip and remove the latch blocking the disabling adjustment clevis (C) on the drawbar (D) (see figure 6). Note down, but do not change the clevis adjustment.
22. Remove pin (E) while supporting the motor and recover the shouldered bushes (F) and the spacer (G) (see figure 6). Note that the rail operating the end of travels is driven by pin (E).

WARNING

If for any reason the Head Section cannot be laid flat, it must be supported when removing the motor from its housing. Disregarding this precaution may result in crush injuries.

23. Remove one of the Truarc clips from the pin at the base of the motor.
24. Remove the pin (I) (see figure 6) while supporting the motor.
25. Remove the motor while lifting and moving it on the side so as not to damage the release drawbar.

WARNING

Note: the end of travel unit of the motor must not be dismantled. Disregarding this precaution can prematurely wear down the internal gears and may cause injuries.

26. Remove the motor drawbar.

    Note: the release trigger plate is integral to the motor.

Installation

1. Perform the removal procedures in reverse order, replacing the used wire ties. Ensure that the slots of the headend and footend covers are correctly positioned in the relevant sockets on the chassis.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.10) Knee Section motor replacement

Tools required: 1 small flat blade screwdriver
1 x 3mm Allen key
1 wire tie cutter

Removal

1. Apply the brakes, adjust the bed to its high position, the Head Section and, if possible, the Knee Section flat then remove the bedframe's hard surfaces.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Adjust the side-rails to intermediate position.
4. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.
5. Remove the headend cover of the bed.
6. Tilt the footend cover of the bed onto its side.
7. With the small flat blade screwdriver, unlock and remove the latch securing the connectors to the power unit.
8. With the wire tie cutter, cut the wire ties securing the various cables to the chassis between the power unit and the split conduit (A) (see figure 1).

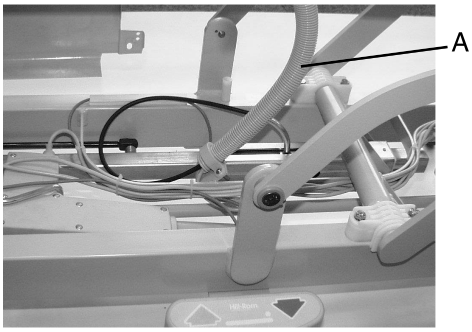


Figure 1 1512A414.tif

9. Unplug connector No. 4 of the power unit (see figure 2).

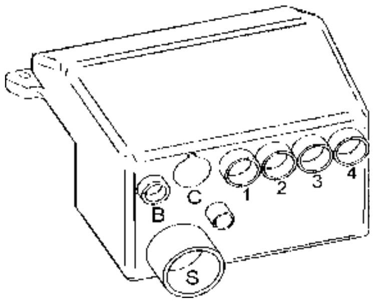


Figure 2 1512A200.tif

10. With the 3mm Allen key, unscrew the four screws securing the jumpers of the split conduit.
11. Remove the Knee Section motor cable from the split conduit.
12. With the wire tie cutter, cut the two ties securing the motor cable to the bedframe crossbar.
13. Remove one of the Truarc circlips from the pin (B) of the motor (see figure 3).

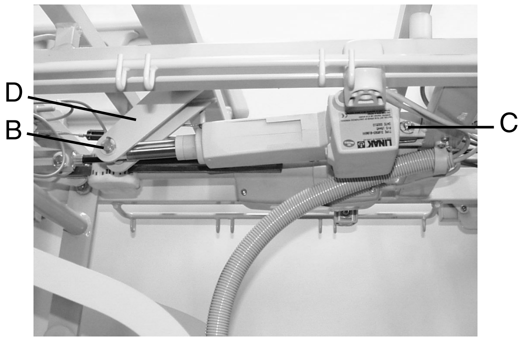


Figure 3 1512A417.tif

14. Remove the pin (B) of the motor while supporting the motor and if necessary the Leg Section of the bedframe (see figure 3).

WARNING

If for any reason the Leg Section cannot be laid flat, it must be supported when removing the motor from its housing. Disrespecting this precaution may result in crush injuries.

15. Recover both shouldered bushes from the pin (B) (see figure 3).
16. Rest the Knee section on the bedframe if necessary.
17. Remove one of the Truac circlips from the pin (C) securing the motor body (see figure 3).
18. Remove pin (C) while supporting the motor, then remove the motor.

Installation

CAUTION

The Knee Section motor is set in-factory and the actuator rod must be maintained at 90°. The initial setting is indicated with an elastic specifying the initial alignment of the two clevises.

Disrespecting this precaution may reduce the performance of the bed and damage the motor.

1. Insert the base of the new motor on the bedframe, ensuring that it is correctly positioned and insert the pin (C) into its housing (see figure 3).
2. Fit the second Truarc circlip on the pin (C).
3. Fit the connector of the new motor to input 4 (see figure 2) of the power unit without attaching the cable.
4. Plug the bed into the mains supply. If the bed has a battery, set the lock-out switches to the “unlocked” position (padlock open).
5. Press the Knee Section lower button on one of the side-rails to bring the tip of the motor rod to the two mounts (D) on the bedframe (see figure 3).
6. Install the two shouldered bushes on the mounts (D) (see figure 3), then the pin (B).
7. Fit the second Truarc circlip on the pin (B).
8. Switch off the bed's power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).
9. Unplug the connector of the new Knee Section motor from the power unit.
10. Secure the motor cable to the bedframe cross-bar with two cable ties. Leave a small length of the cable free between the motor and the split conduit so that there is no traction on the cable when the motor moves.

    Note: the conduit slot must **always** be directed to the top end of the bed to prevent noise when the bed is functioning.
11. Perform steps 11 to 1 of the removal procedure in reverse order, replacing the used cable ties. Make sure that the headend and footend cover slots are correctly positioned in the places provided on the chassis.
12. Perform the "Function Checks" on page 2-3 of this manual.

4.11) Trendelenburg End of Travel and Reverse Trendelenburg assist switch assembly replacement

Tools required: 1 x 3mm Allen key
1 wire tie cutter

Removal

1. Apply the brakes, then adjust the bed to its high position and raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. With the 3mm Allen key, unscrew the four screws securing the headend and footend covers of the bed. Recover the washers
4. Remove the headend cover of the bed.
5. Tilt the footend cover of the bed onto its side .
6. With the 3mm Allen key, unscrew both screws securing the chassis junction box (A) (see figure 1).

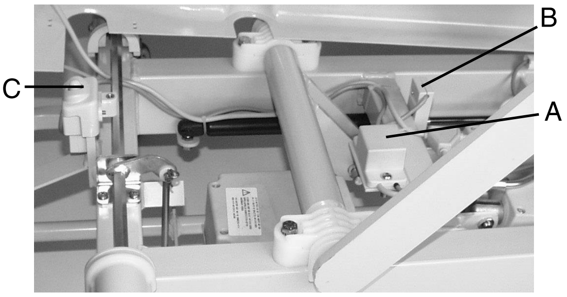


Figure 1 1512A418.tif

7. Note the position of the cables (see figure 2), then remove the printed circuit from the junction box.

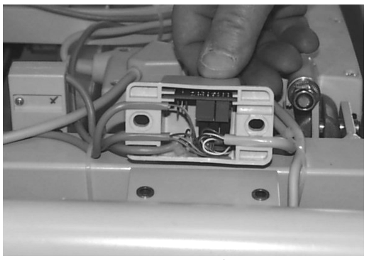


Figure 2 1512A419.tif

8. Unplug the C1, C2 or C3 connector corresponding to the end of travel unit (see figure 3).

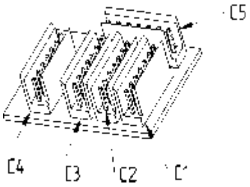


Figure 3 1512A406.tif

9. Cut the wire ties securing the end of travel unit cables to the chassis.
10. With the 3mm Allen key, unscrew the hexagon socket-type screws securing the Reverse Trendelenburg assist switch (B) and the Trendelenburg end of travel (C) to the chassis (see figure 1).
11. Slightly raise the Trendelenburg end of travel support and remove it from the housing.
12. Recover the four metal spacers.

Installation

1. Perform the removal procedure in reverse order, replacing the used cable ties.

   Note: the Trendelenburg end of travel is a switch that is normally closed, whereas the Reverse Trendelenburg assist switch is a normally open switch.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.12) Trendelenburg/Reverse Trendelenburg cable replacement

Tools required: 1 x 3mm Allen key
1 x 10mm open end wrench
1 x 17mm open end wrench
1 multigrip pliers
1 med. Phillips head screwdriver
1 small flat blade screwdriver

Removal

1. Apply the brakes, then adjust the bed to its high position, and if possible horizontally.
2. Set the Head Section and Knee Section flat and the side-rails to high position. If the bed is fitted with an extension, put it in the extended position.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

⚠ **Technical staff may be injured if the bed is not disconnected from its power supply.**

4. Remove the bedframe hard surfaces.
5. With the 17mm open end wrench, loosen the Nylstop locking nut of the cable at the Trend./Rev. Trendelenburg control lever.

   Note: the cable runs through the hole provided in the lever between the two plastic spacers so as to return towards the inside of the bed.
6. Operate the Trend./Rev. Trendelenburg lever to free the cable.
7. With the 10mm open end wrench and the multigrip pliers, loosen and remove the plastic bush (A) screwed onto the adjusting device (B) on the Trend./Rev. Trend. lever support. Remove the sleeve (D) from the support (E) (see figure 1).

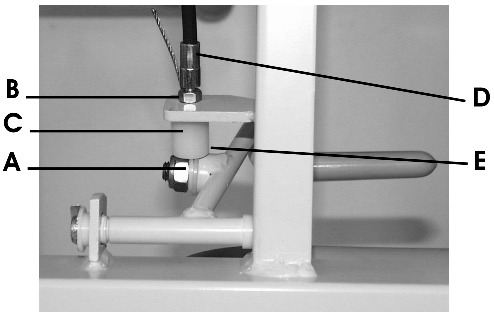


Figure 1 1512A420.tif

8. With the 3mm Allen key, unscrew and remove the screw securing the sleeving strap from under the crossbar of the bedframe footend and recover the strap.
9. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed.
10. Remove the headend cover of the bed.
11. Tilt the footend cover of the bed onto its side .
12. With the 3mm Allen key unscrew, the four screws securing the split conduit.
13. Remove the Trendelenburg/Reverse Trendelenburg cable sleeving from the split conduit. Note that when subsequently installing the conduit, the conduit slot is turned towards the headend of the bed to prevent any noise when the bed is functioning.
14. Remove the sleeving from the release frame (F) (see figure 2).

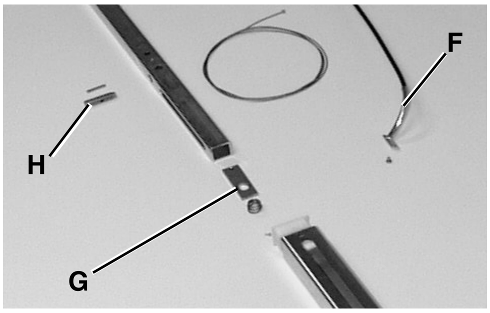


Figure 2 1512A421.tif

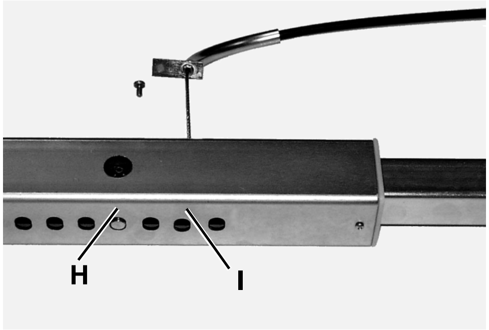


Figure 3 1512A422.tif

15. With the med. Phillips head screwdriver, unscrew the screw securing the release frame and pull the frame to withdraw it from its housing.
16. Remove the cable of the Trendelenburg/ Reverse Trendelenburg mechanism from beneath the mechanism.

    The cable must exit via one of the locking catches. If the position of the mechanism prevents this, press the release plate (G) (see figure 2) located inside the Trendelenburg/ Reverse Trendelenburg mechanism using the small flat blade screwdriver. To do this, insert the screwdriver into the opening (I) (see figure 3) of the mechanism between the two catches to the right of the release (H) (see figure 3) and slide the mechanism by lowering or raising one end of the bedframe until the end of the cable can be seen.

    Note: two people are required to carry out this operation.

Installation

1. Perform steps 16 to 7 of the removal procedure in reverse order, replacing the Nylstop locknut then perform the “**Adjustment**” procedure of the following section from step 3.
2. Perform the "Function Checks" on page 2-3 of this manual.

Adjustment

1. Ensure that the bed is in the high position.
2. With the 17mm open end wrench, loosen the Nylstop locknut locking the cable at the Trendelenburg/Reverse Trendelenburg control lever.
3. Operate the Trendelenburg/Reverse Trendelenburg lever to decompress the cable.
4. Fully tighten the adjustment screw (C) on the adjuster device (B) of the Trendelenburg/ Reverse Trendelenburg cable sleeving (see figure 1).
5. Run the cable through the hole provided on the control lever between the two plastic spacers (I) (se figure 5) then manually pull the cable so that it is taut.
6. While maintaining the traction on the cable (caution: the spring within the mechanism must not be compressed), direct the tip of the cable towards the inside of the bed, then tighten the Nylstop locknut (H) using the 17mm open end wrench and leaving 3mm between the end of the screw and the threaded bar (see figure 5).

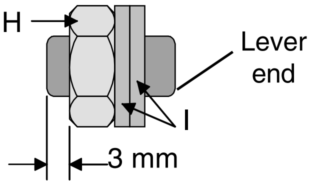


Figure 5 1512A423.wmf

If the plastic spacers are worn down (I), you can adjust the tightness or replace the spacers.

Note: the Trendelenburg/Reverse Trendelenburg interlock, located under the bed, must slightly overshoot the mechanism when the control lever is not activated.

7. If any noises are heard when the notches are passed, the cable tension must be adjusted. The adjuster (B) must be used in this case (see figure 1). To do this, loosen the plastic bush (A) screwed into the adjuster and tighten the adjustment screw (C) (see figure 1) to position the cable correctly.

4.13) Trendelenburg/Reverse Trendelenburg mechanism replacement

Note: there is no reference for the full mechanism. This procedure allows you to remove the mechanism completely with a view to replacing any defective parts.

Tools required: 1 small flat blade screwdriver
1 medium flat blade screwdriver
1 med. Phillips head screwdriver
1 x 10mm open end wrench
1 x 13mm open end wrench
1 x 17mm open end wrench
1 x 3mm Allen key
1 multigrip pliers
1 4mm pin-punch
1 hammer

Removal

1. Adjust the Head Section and Knee Section of the bed to the low position and the bed to high position, then remove the bedframe's hard surfaces.

WARNING

The bed must be in high position to carry out the rest of the procedure. Failure to do so could result in personal injury.

2. With the 3mm Allen key, unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.
3. Remove the headend cover of the bed.
4. Leave the footend of the bed free.
5. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

There is a risk of crush injury if the battery is not unplugged from its power source when the Trendelenburg/Reverse Trendelenburg mechanism is being repaired or serviced.

6. Raise the side-rails.
7. With the 17mm open end wrench, loosen the Nylstop locknut on the cable at the Trendelenburg/Reverse Trendelenburg control lever.

Note: the cable runs through the hole provided in the lever between the two plastic spacers and is folded so as to return towards the inside of the bed.

8. Operate the Trendelenburg/Reverse Trendelenburg lever to free the cable.
9. With the 10mm open end wrench and the multigrip pliers, loosen and remove the plastic bush screwed onto the adjuster located on the Trendelenburg/Reverse Trendelenburg lever support. Next, remove the “adjuster + sleeving” assembly of the lever and extension lever support.
10. With the 3mm Allen key, unscrew and remove the screw securing the sleeving strap under the crossbar of the bedframe footend, and recover the strap.
11. With the 3mm Allen key, unscrew the four screws securing the jumpers of the split conduit.
12. Remove the Trendelenburg/Reverse Trendelenburg cable sleeving from the split conduit. Note that when subsequently reassembling, the conduit slot is turned to the foot of the bed to prevent any noise when the bed is functioning.
13. Turn the lefthand castors of the bed inwards (the viewpoint of a patient lying on the bed is used), and apply the brakes.
14. Tilt the bed onto its lefthand side.

WARNING

⚠ **Two people are required to carry out this operation. Disregarding this precaution may result in injuries.**

15. Free the Trendelenburg/Reverse Trendelenburg assist gas spring. To do this, slightly raise the gas spring end locking clip (B) with the small flat blade screwdriver (see figure 1) without removing it and raise the gas spring rod by using the mallet handle.

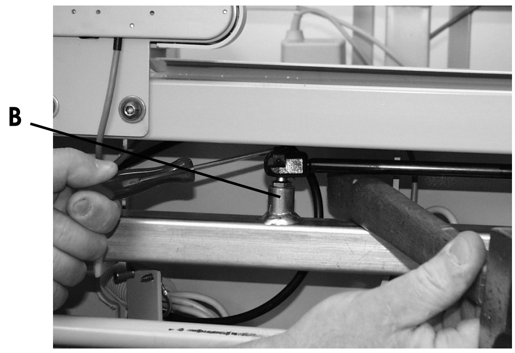


Figure 1 1512A424.tif

WARNING

⚠ **The gas spring is always partially under pressure and the rod may suddenly extend by 2cm. Never place your hands in the axis of the gas spring. Failure to do so could result in personal injury.**

16. Remove both Truarc circlips from the pin (A) at the end of the Trendelenburg/Reverse Trendelenburg mechanism (see figure 2).
17. With the multigrip pliers, remove the end pin at A (see figure 2) and recover the relevant shouldered bushes.

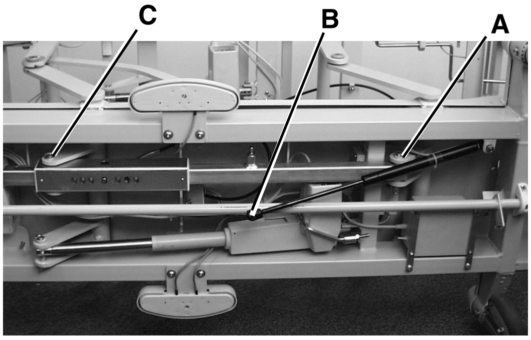


Figure 2 1512A425.tif

18. Remove both Truarc circlips from the pin (C) at the base of the Trendelenburg/Reverse Trendelenburg mechanism (see figure 2). Note that the circlips are fitted to the outer grooves of the pin.
19. With the multigrip pliers, remove the pin (C) (see figure 2), remove the Trendelenburg/Reverse Trendelenburg mechanism and recover the shouldered bushes on the mounts. Continue the procedure on a workbench.
20. With the medium Phillips head screwdriver, unscrew the screw securing the release frame (F) (see figure 3) and pull on the frame to remove it from the housing.

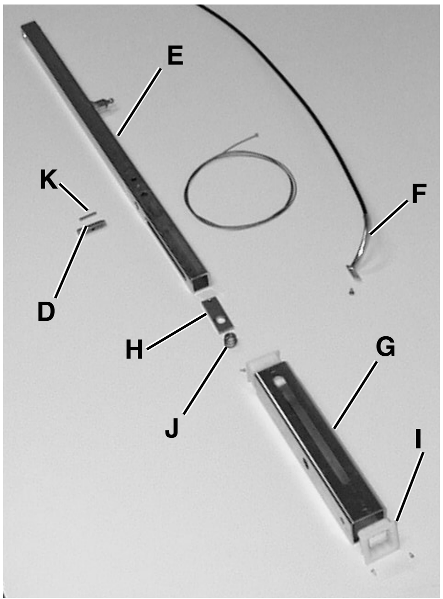


Figure 3 1512A421.tif

21. Remove the sleeving from the release frame.
22. Remove the Trendelenburg/Reverse Trendelenburg mechanism cable from underneath the mechanism (see figure 4). The cable must exit through one of the position lock notches. If the position of the mechanism does not permit this, press the release plate (H) (see figure 3) inside the Trendelenburg/ Reverse Trendelenburg mechanism using the small flat blade screwdriver. To do this, insert the screwdriver into the opening (O) (see figure 4) two notches to the right of the release (D) (see figure 3) and move the tube (E) (see figure 3) to the right or left until the end of the cable can be seen.

    Note: Two people are required to carry out this operation.

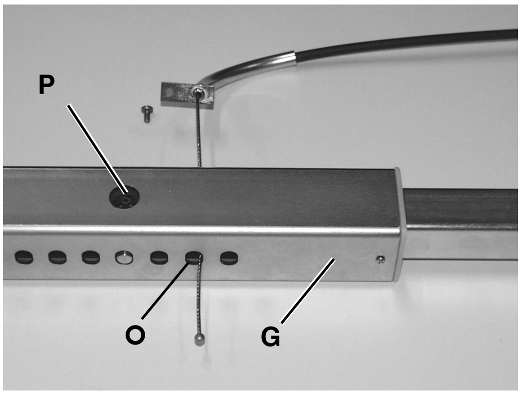


Figure 4 1512A426.tif

23. With the 4mm pin-punch and the hammer, knock out the pin (K) from the release (D) (see figure 3) via the opening (P) (see figure 4). A piece of wood can be placed under the mechanism.

    Note: the end of the pin is slightly crushed using a pair of flat pliers to make assembly easier. It is positioned between the release plate and the spring and is centred on the release (D).
24. Remove the release (D) from above the sliding tube (G) (see figure 3).
25. Remove the tube (E) from the slide tube (G) (see figure 3).
26. From the actual position of the spring (J), opposite the opening (P) (see figure 4), tilt the tube (E) or use a medium flat blade screwdriver to recover the release plate (H) and the spring (J) (see figure 5).

    Note: when worn down, the spring becomes conical. It should be replaced if this is the case.

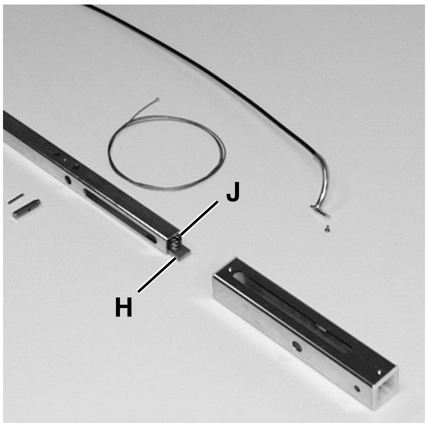


Figure 5 1512A427.tif

27. With the medium Phillips head screwdriver, unscrew and remove the four screws securing the pads (I) of the sliding tube (G) (see figure 3).
28. Remove the pads (I) from the sliding tube (G) (see figure 3).

Installation

1. Perform steps 28 to 20 of the removal procedure in reverse order. The mechanism must have already been set to maximum Trendelenburg/Reverse Trendelenburg position with the release in mid-position (see figure 6).

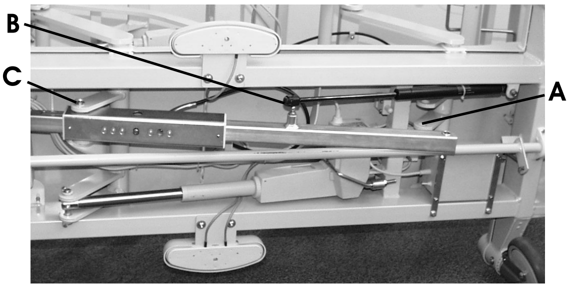


Figure 6 1512A428.tif

2. Fit both the shouldered bushes at (C) (see figure 6).
3. Position the Trendelenburg/Reverse Trendelenburg mechanism at (C) and fit the corresponding pin.
4. Fit the Truarc ciclips of the pin at (C). Note that the pins are fitted on the outer grooves of the pin.
5. Fix the end of the assist gas spring at (B) (see figure 6) on the Trendelenburg/Reverse Trendelenburg mechanism. To do this, slightly raise but do not completely withdraw the securing clip of the assist gas spring by using the small flat blade screwdriver and press the head of the gas spring rod.

   Note: the securing clip must be fitted and its position correct: in full contact with the gas spring head and within the relevant groove.
6. Fit both the shouldered bushes on the two mounts (A) (see figure 6).
7. Push the Trendelenburg/Reverse Trendelenburg mechanism to bring it to the level of the mounts at (A) (see figure 6) and fit the corresponding pin.

   Note: it may be necessary to adjust the separation of the bedframe and chassis by hand to be able to position the pin. Moreover, a certain amount of force is required to counter the pressure of the assist gas spring.
8. Fit the corresponding Truarc circlips. Note that these circlips are fitted on the outer grooves of the pin.
9. Perform steps 14 to 7 of the removal procedure in reverse order (without tightening the cable) then adjust the cable as in procedure **4.12**.

   Finally, remember to correctly position the notches of the headend and footend covers in their proper positions on the chassis.
10. Perform the "Function Checks" on page 2-3 of this manual.

4.14) Trendelenburg/Reverse Trendelenburg assist gas spring replacement

Tools required: 1 small flat blade screwdriver
1 x 13mm open end wrench
1 wire tie cutter
1 multigrip pliers

Removal

1. Adjust the Head Section and Knee Section of the bed to the low position and the bed to the high position, then remove the bedframe's hard surfaces.

WARNING

The bed must be in high position to carry out the rest of the procedure. Failure to do so could result in personal injury.

2. Set the bedframe the maximum Trendelenburg/ Reverse Trendelenburg position using the Trendelenburg/Reverse Trendelenburg lever.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

There is a risk of crush injury if the battery is not unplugged from its power source when the Trendelenburg/Reverse Trendelenburg mechanism is being repaired or serviced.

4. Raise the side-rails.
5. Turn the lefthand castors of the bed inwards (the viewpoint of a patient lying on the bed must be used), and apply the brakes.
6. Tilt the bed onto its lefthand side.

WARNING

Two people are required to carry out this operation. Failure to do so could result in personal injury.

7. Free the Trendelenburg/Reverse Trendelenburg assist gas spring. To do this, slightly raise the gas spring end securing clip (B) with the small flat blade screwdriver (see figure 1) without removing it and move apart the gas spring rod by using the mallet handle.

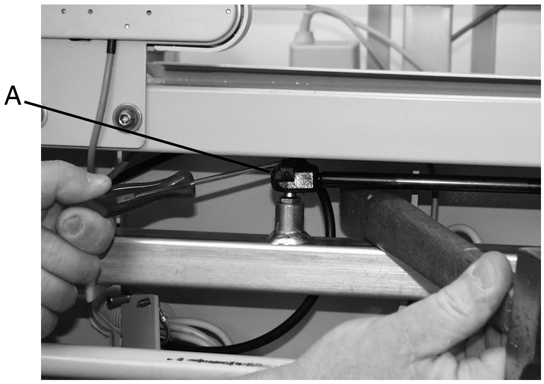


Figure 1 1512A424.tif

WARNING

The gas spring is always partially under pressure and the rod may suddenly extend by 2cm. Never place your hands in the axis of the gas spring. Failure to do so could result in personal injury.

8. With the 13mm open end wrench, unscrew and remove the screw securing the base of the gas spring to the chassis.
9. Remove the gas spring.

Installation

1. Remove both Truarc circlips of the pin (B) at the end of the Trendelenburg/Reverse Trendelenburg mechanism (see figure 2). Note that the circlips are fitted on the outer grooves of the pin.

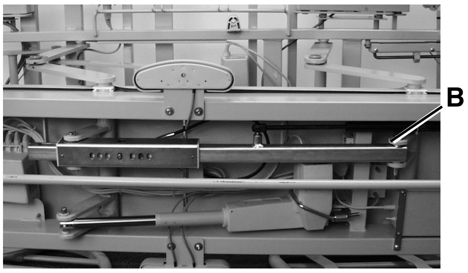


Figure 2 1512A429.tif

2. With the multigrip pliers, remove the pin (B) (see figure 2).
3. Pull on the Trendelenburg/Reverse Trendelenburg mechanism to remove it from the housing.
4. Recover the two shouldered bushes of the pin housing (B) (see figure 2).
5. Fix the end of the assist gas spring at (C) (see figure 3) on the Trendelenburg/Reverse Trendelenburg mechanism. To do this, slightly raise the assist gas spring securing clip by using the small flat blade screwdriver (see figure 3) without removing it and press the head of the gas spring rod and release the securing clip.

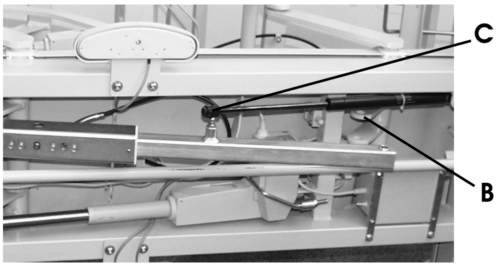


Figure 3 1512A428.tif

Note: the securing clip must be fitted and its position correct: in full contact with the gas spring head and within the relevant groove.

6. Fit both shouldered bushes onto the mounts at (B) (see figure 3).
7. Push the Trendelenburg/Reverse Trendelenburg mechanism to bring it to the level of the mounts at (B) (see figure 2) and fit the corresponding pin.

   Note: it may be necessary to adjust the separation of the bedframe and chassis by hand to be able to position the pin. Moreover, a certain amount of force is required to counter the pressure of the assist gas spring.
8. Fit the corresponding Truarc circlips. Note that the circlips are fitted on the outer grooves of the pin.
9. Perform steps 6 to 3 of the removal procedure in reverse order.

   Note: remember to correctly position the notches of the headend and footend covers in their proper positions on the chassis.
10. Perform the "Function Checks" on page 2-3 of this manual.

4.15) Head Section assist gas spring replacement

Tools required: 1 multigrip pliers
1 adjustable wrench

Removal

1. Adjust the bed to its high position.
2. Adjust the Head Section to high position and lower the side-rails.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

⚠ **Technical staff may be injured if the bed is not disconnected from its power supply.**

4. Remove the bedframe hard surfaces.
5. Remove both of the Truarc circlips securing the gas spring.
6. Remove the gas spring from its housing, beginning with the Head Section end.
7. Holding the gas spring rod with the multigrip pliers, unscrew the gas spring plate (end) and remove it from the rod. The adjustable wrench can be used to unscrew the plate with less trouble.

Installation

1. Fit the plate to the rod of the new gas spring and tighten it with the multigrip pliers and adjustable wrench.
2. Fit the new gas spring to the bed, beginning with the base of the gas spring.
3. Perform steps 5 to 1 of the removal procedure in reverse order.
4. Perform the "Function Checks" on page 2-3 of this manual.

4.16) Head Section disable system replacement

Note: the Head Section disable cable is common to both release levers.

Tools required: 1 x 3mm Allen key
1 wire tie cutter
1 multigrip pliers
1 needle nosed pliers
1 x 100mm ruler.

Removal

1. Adjust the bed to its high position, then apply the brakes.
2. Adjust the Head Section to high position and lower the side-rails.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

⚠ **Technical staff may be injured if the bed is not disconnected from its power supply.**

4. Remove the bedframe hard surfaces.
5. Unclip and remove the catch clip securing the drawbar of the disabling mechanism.
6. Unscrew the nuts of the two adjusters under the bedframe.
7. Remove the two adjusters from the square bracket under the bedframe.
8. With the wire tie cutter, cut the plastic tie securing the cable sleeving on the Head Section and bedframe. Note that the sleeving is also fixed to the side-rail electric cables.
9. Remove the support notch sleeving (A) under the bedframe (see figure 1). To do this, it is also necessary to remove the conduit protecting the side-rail cables.

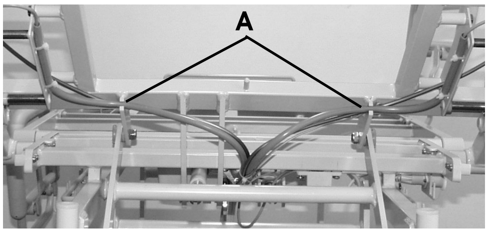


Figure 1 1512A430.tif

10. With the 3mm Allen key, slightly unscrew the two locking screws (B) of the cable sleeving at the disabling levers (see figure 2).

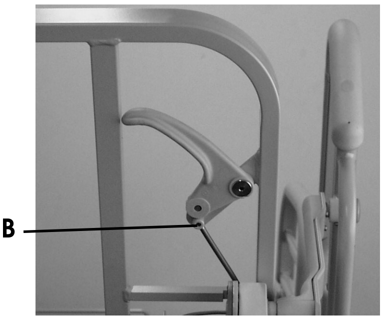


Figure 2 1512A431.tif

11. Remove the sleeving ends from the disabling lever supports.
12. Remove the cable ends from the disabling levers.
13. Remove the two sleeves of the side-rail bracket.
14. Remove the cable and sleeving assembly.

Installation

1. Insert the sleeving of the new cable into the side-rail supports.
2. Insert the two ends of the cables into the places provided on the disabling levers.
3. Insert the ends of the sleeves into the disabling lever supports.
4. With the 3mm Allen key, screw in the two cable sleeve locking screws on the two disabling levers.
5. Insert the two adjusters into the square bracket under the bedframe.
6. With the needle nosed pliers and multigrip pliers, screw the nuts of the two adjusters under bedframe (see figure 3).

   Note: the cable tension is not adjusted by these adjusters.

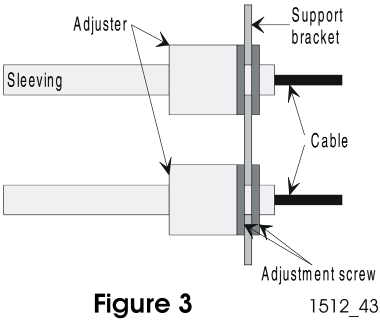


Figure 3 1512_432.wmf

8. Replace the used plastic cable tie.
9. Adjust the cable tension by following the instructions of the “**Adjustment**” section below, from step 3.
10. Perform the "Function Checks" on page 2-3 of this manual.

Adjustment

Note: The cable tension is adjusted from the clevis on the disabling drawbar, and not from the adjusters under the bedframe.

1. Check that the adjusters are positioned correctly with respect to the square bracket. They should touch the square bracket (see figure 3). If necessary, adjust them using the multigrip pliers and the needle nosed pliers.
2. Unclip and remove the catch clip securing the disable drawbar.
3. Tighten or loosen the disabling drawbar clevis to leave a space of 5mm +/- 1mm (see fig. 4).

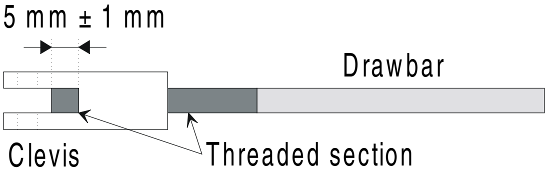


Figure 4 1512_433.wmf

Note: The essence of this adjustment is to ensure that the motor disable system, activated by the drawbar, completely retracts when the Head Section disabling lever is released, taking into account that the motor moves slightly when in use.

4. Bring the clevis cable closer, possibly by operating the manual disable function.
5. Replace and clip on the catch clip securing the cable to the disabling drawbar.

4.17) Castor, Steer/Brake castor replacement

Several types of castor are fitted to the Evolution bed with different markings:

Model	Marking
Single wheel Dia. 150 castor, uncovered, steering brake	Two rivets on the castor body.
Single wheel Dia. 150 castor, uncovered, brake:	No marking
Beige twin wheel Dia. 150 and integral single wheel, steering brake:	Black bushing on the upper part of the castor.
Beige twin wheel Dia. 150 and integral single wheel, brake:	Colourless bushing on the upper part of the castor.
Beige antistatic dia. 150, single and twin wheel, brake, brake + steering:	Yellow dot on the side.
Beige antistatic dia. 150, single and twin wheel, brake:	Yellow upper cover.

1512Atbl_401

Tools required:
1 small Phillips head screwdriver
1 med. Phillips head screwdriver
1 hammer
1 x 8 or 10mm dia. pin-punch.
1 x 3mm Allen key
1 x 5mm Allen key
1 x 10mm Allen key

Removal

1. Adjust the bed to its high position and raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Technical staff may be injured if the bed is not disconnected from its power supply.

3. Apply the brakes.

WARNING

Disregarding this precaution may result in injuries.

4. Raise the side of the bed with the castor to be changed and place a 30cm high block under the chassis, being careful not to rest the chassis on the brake bar.

WARNING

Two people are required to lift the bed. Failure to do so could result in personal injury.

5. With the 3mm Allen key, unscrew the four screws securing the headend and footend covers of the bed. Recover the washers.
6. Remove the headend cover of the bed if the castor to be changed is at the headend of the bed.
7. Tilt the footend cover of the bed onto its side if the castor to be changed is at the footend of the bed.
8. With the Phillips head screwdriver, unscrew the screw (A) securing the castor hood (see figure 1).

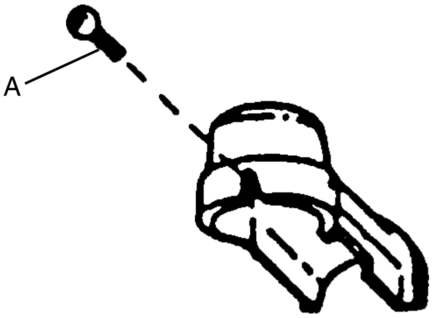


Figure 1 1512A434.tif

9. Remove the hood from the castor.
10. Repeat steps 8 and 9 for the castor hood opposite the one to be replaced.
11. Next to the castor to be replaced, remove the brake pin (E) and the plastic washer (F) of the brake rod (G) then remove it from its housing (see figure 2).

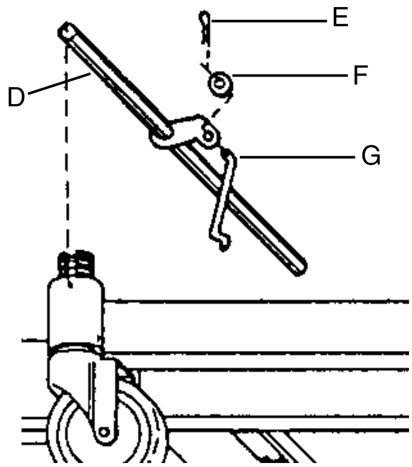


Figure 2 1512A435.tif

12. If the castor to replace is on the righthand side (the viewpoint of a patient lying on the bed must be used): slide the hexagonal bar (D) to free the castor. Use the hammer and pin-punch to make the task easier.

    If the castor to replace is on the lefthand side: use the medium Phillips head screwdriver to remove two screws securing the guide bracket of the hexagonal brake bar.
13. Punch out the hexagonal bar from the castor to be replaced (make sure its position is correctly noted before replacing it).
14. With the 5mm Allen key, unscrew the two screws securing the castor while supporting the castor.
15. Remove the castor by sliding it downwards.

Installation

1. Insert the 10mm Allen key in place of the hexagonal bar in the castor. Set the brakes on the castor by turning the key 90° or 180° according to the initial position.

   Note: the castor has three positions:

   - either two neutral positions and one braked position.

   - or one steer position, then neutral followed by brake.
2. Remove the 10mm Allen key from the new castor and fit the castor into its housing.
3. Position the castor to ensure that the rotation of the hexagonal bar in the castor properly activates the neutral position.

WARNING

Disregarding this precaution may cause the brake and steer system to malfunction.

4. Slide the hexagonal bar into the castor.

   Note: new castors are delivered with the brakes already adjusted.

   The adjustment procedure is not required in normal circumstances when fitting a new castor to the bed.
5. Perform the steps of the castor removal procedure in reverse order.

   Note: apply medium strength loctite to both screws securing the castor, to ensure correct locking.
6. Perform the "Function Checks" on page 2-3 of this manual.

Adjustment of brakes: single and twin wheel castors.

1. Adjust the bed to its high position and raise the side-rails.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Technical staff may be injured if the bed is not disconnected from its power supply.

3. Apply the brakes.

WARNING

Failure to do so could result in personal injury.

4. Raise the side of the bed with the castor to be changed and place a 30cm high block under the chassis, being careful not to rest the chassis on the brake bar.

WARNING

Two people are required to lift the bed. Failure to do so could result in personal injury.

5. With the 5mm Allen key, unscrew the two screws securing the castor.

Note: the brake is adjusted with the castor in braked position, by the number of half-turns made on the castor from the initial point of contact between the tyre and its braking system. The number of half-turns depends on the type of castor.

6. Turn the body of the castor anticlockwise (viewed from above) by successive half-turns until the brake is no longer in contact with the wheel.

CAUTION

Twin wheel castor: it is very important not to continue turning the body of the castor when the brakes are no longer in contact.

7. Turn the body of the castor clockwise (viewed from above) by successive half-turns until the first point of contact between the tyre and the brake system.

   Note: twin wheel castor: if the body of this castor is too loose, it may not be possible to adjust it. In this case, unclip and remove the upper cover (A) (see figure 4) with the small flat blade screwdriver; apply adhesive tape to (B) around the castor rod to block the two outer parts. Unclip the lower cover (C) of the castor with a screwdriver inserted into each side of the castor between the wheels. Lift and remove the castor cover. Using the multigrip pliers with the brakes applied, press the two notched parts of the castor together (see figure 4) while turning the body of the castor clockwise (viewed from above), until the brake begins to touch the wheels. Next, fit the castor covers.

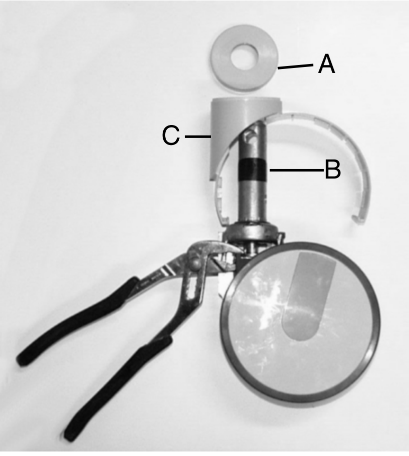


Figure 4 1512A436.tif

8. Next, turn the castor as follows:
   - **non antistatic** single wheel castor: **4** half-turns clockwise (viewed from above).
   - **antistatic** single wheel castor: **3** half-turns clockwise (viewed from above).
   - **antistatic** and **non antistatic** twin wheel castor: **3** half-turns clockwise (viewed from above).
9. Position the two screws securing the castor and tighten them with the 5mm Allen key.

   Note: apply medium strength loctite to both screws securing the castor, to ensure correct locking.
10. Remove the block under the bed.

WARNING

Two persons are required to lift the bed. Failure to do so could result in personal injury.

11. Apply the brakes and check that the brakes work efficiently by pushing the bed over a flat surface using a force of 200 newtons. The bed should not move.

Adjustment of the brake and steer castor

There is no specific adjustment for the steering system of the castors, only their position should be checked when removing and installing. Refer to the **Refitting** and **Braking adjustment** sections of this procedure.

4.18) Head and footboard replacement

Tools required: no tools are required to perform this action.

Removal

The head and footboards are not locked. Lift them upwards to remove them from their sockets.

Installation

Install the head or footboard by inserting the two chrome-plated guides of the lower part of each board into the slots provided on the bedframe.

4.19) Footboard linen holder replacement

Tools required: no tools are required to perform this action.

Removal

1. If the board is horizontal, lift it so that it is vertical and lower it vertically using the guides.
2. Unlock the board manually by pulling the cords of the two clips under the bedframe.
3. Raise the board vertically to remove it.

Installation

1. Perform the removal procedure in reverse order.
2. Make sure the board is correctly fitted and clipped and that it tips smoothly outwards without becoming detached.

4.20) Headend side-rail replacement

Tools required: 1 x 3mm Allen key
1 x 13mm open end wrench
1 wire tie cutter

Removal

1. Apply the brakes, then adjust the bed to its high position, the Head Section to intermediate position, and the Knee Section flat, then remove the bedframe's hard surfaces.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Set the headend side-rails to low position.
4. With the 3mm Allen key, unscrew the two screws securing the bedframe junction box (fixed under the headend crossbar of the bedframe). Recover the two washers.
5. Note the position of the cables (see figure 1), then remove the printed circuit from the junction box.

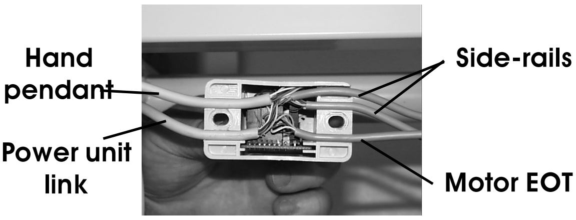


Figure 1 1512A407.tif

6. Unplug the connector of the side-rail to be removed (C1: lefthand side-rail or C2: righthand side-rail) from the printed circuit (see the marking under the circuit).
7. With the 3mm Allen key, loosen the screws securing the square bracket that fixes the plastic sleeving of the side-rail cable under the bedframe, and free this sleeving.
8. With the wire tie cutter, cut the plastic cable tie between the bedframe junction box and the side-rail, including those on the side-rail guide, while noting the position of the plastic conduit of the cable.

9. Set the side-rail to the high position.
10. Remove the conduits from the support slots (A) under the bedframe (see figure 2). To do this, it is also necessary to remove the conduit protecting the side-rail cables.

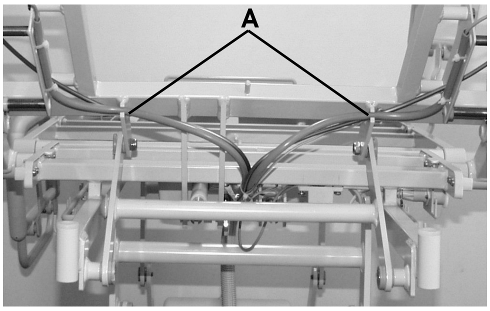


Figure 2 1512A430.tif

11. With the 13mm open end wrench, unscrew both screws (B) securing the side-rail while supporting the side-rail (see figure 3).

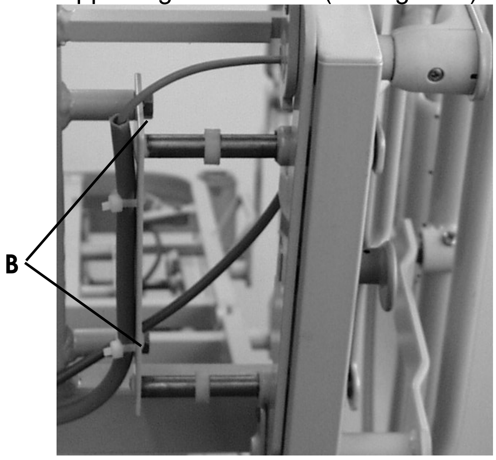


Figure 3 1512A437.tif

12. Tilt the side-rail and its support inwards, without forcing so as not to damage the CPR cable.
13. Remove the side-rail support and the two guides from the bedframe.
14. Separate the side-rail from its support (which remains on the bed) and recover the two plastic spacers.

Installation

1. Perform the removal procedure in reverse order, replacing the used cable ties.

   Note: if the side-rail or the connector(s) must be removed, refer to **RAP 4.2** of this section.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.21) Footend side-rail replacement

Tools required: 1 x 13mm open end wrench

Removal

1. Apply the brakes and set the side-rail to the high position.
2. With the 13mm open end wrench, unscrew the two screws securing the side-rail support, while holding the side-rail.
3. Tilt the side-rail and its support inwards.
4. Remove the side-rail support and the two guides from the bedframe.
5. Separate the side-rail from its support (which remains on the bed) and recover the two plastic spacers.

Installation: general procedure

1. Perform the removal procedure in reverse order.
2. Perform the "Function Checks" on page 2-3 of this manual.

4.22) Mechanical Leg Section cable replacement

Note: The control cable of the mechanical Leg Section is common to the two side levers.

Tools required: 1 x 3mm Allen key
1 x 4mm Allen key
1 small flat blade screwdriver
1 wire tie cutter
1 needle nosed pliers
1 x 4mm pin-punch
1 hammer

Removal

1. Adjust the bed to its high position, then apply the brakes.
2. Lay the Leg and Foot Sections flat and put the side-rails in mid-position.

WARNING

Technical staff may be injured if the bed is not disconnected from its power supply.

3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).
4. Remove the bedframe hard surfaces.
5. With the 3mm Allen key, slightly unscrew the locking screws securing the cable sleeving to the Leg Section control levers. These screws are located under the lever supports.
6. Remove the ends of the Leg Section lever support sleeving.
7. Remove the ends of the disabling lever cables. The operation is made easier by sliding the sleeving in the side-rail supports.
8. With the wire tie cutter, cut the cable tie securing the cable sleeving.
9. Remove the side-rail cable and sleeving assembly.
10. Remove one of the Truarc circlips of the pin from the end of the Leg Section mechanism rod and remove the pin. Recover the spacers.
11. Remove one of the Truarc circlips of the pin from the base of the Leg Section mechanism and remove the pin while supporting the mechanism. Recover the spacers.
12. Remove the Leg Section mechanism from the bed and continue the procedure on a workbench.
13. With the 4mm Allen key, unscrew but do not remove the screw securing the sleeving stop flat (see figure 1).

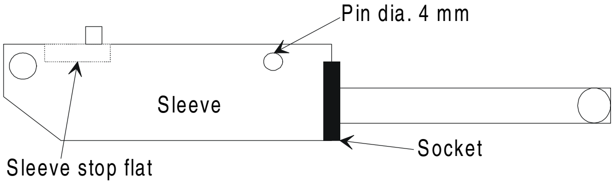


Figure 1 1512_438.wmf

14. With the 4mm pin-punch and the hammer, remove the pin on the side of the Leg Section sleeving.
15. With the small flat blade screwdriver and the hammer, remove the socket from the mechanism (see figure 1) and pull out the assembly to access the catch.
16. With the needle nosed pliers, bend back the end of the spring (A) (bent to prevent it from springing out from its position) and remove it from the catch (B) (see figure 2).

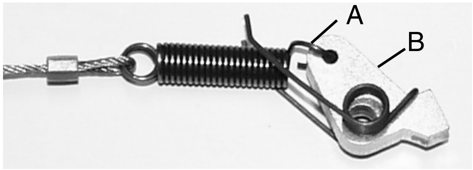


Figure 2 1512A439.tif

17. Remove the cable from the spring and pull the cable and sleeving assembly from the Leg Section sleeving.

Installation

1. Insert the new sleeving and cable assembly into the sleeve in the opposite direction to when it was removed, running the sleeving over the stop flat.
2. With the small flat blade screwdriver, insert the new cable into the loop of the release spring.
3. Fix the spring (A) (see figure 2) to the catch and bend the tip using the needle nosed pliers to stop it from springing back from the housing.
4. Insert the socket + catch + spring assembly into the Leg Section sleeve.
5. With the hammer, insert the pin into its location in the Leg Section sleeve.
6. Position the Leg Section mechanism on the bedframe and fit the pin and spacers located on the socket.
7. Fit the Truarc circlips removed from the previous pin.

8. Position the end of the Leg Section mechanism in its proper location and insert the corresponding pin, remembering to fit the spacers.
9. Fit the Truarc circlips removed from the previous pin.
10. Run the two sleeves through the side-rail supports.
11. Fix the ends of the cables to the Leg Section control levers.
12. Fix the ends of the sleeves to the Leg Section control lever supports.
13. Replace the used cable tie securing the sleeving.
14. With the 3mm Allen key, screw in the sleeve locking screws on the Leg Section control levers.
15. Adjust the system, following the next section from step 3.
16. Perform the "Function Checks" on page 2-3 of this manual.

Adjustment

1. Check that the cable common to both Leg Section controls is in good condition.
2. With the 4mm Allen key, loosen the screw securing the sleeving stop flat (see figure 1 of the removal procedure) and slacken the sleeving.
3. Pull the sleeving/cable assembly from the Leg Section sleeving until the Leg Section control levers touch their support.
4. Once the levers touch the support, tighten and block the sleeving stop screw using the 4mm Allen key.

   CAUTION: there must be no pull on the release spring when the stop screw is locked.

   Note: a “click” must be heard when it passes a notch, if the Leg Section is raised manually from the low position without operating the levers.

4.23) Mechanical Leg Section replacement

Note: there is no reference for the complete Leg Section. This procedure completely removes the Section with a view to replacing any defective parts.

Note: the control cable of the mechanical Leg Section is common to both side levers.

Tools required: 1 x 3mm Allen key
1 x 4mm Allen key
1 small flat blade screwdriver
1 wire tie cutter
1 needle nosed pliers
1 x 4mm pin-punch
1 hammer

Removal

1. Adjust the bed to its high position, then apply the brakes.
2. Lay the Leg and Foot Sections flat and put the side-rails in mid-position.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Technical staff may be injured if the bed is not disconnected from its power supply.

4. Remove the bedframe hard surfaces.
5. With the 3mm Allen key, slightly unscrew the locking screws securing the cable sleeving to the Leg Section control levers.
6. Remove the ends of the Leg Section lever support sleeving.
7. Remove the ends of the Leg Section lever cables. The operation is made easier by sliding the sleeving in the side-rail supports.
8. With the wire tie cutter, cut the cable tie securing the cable sleeving.
9. Remove the side-rail cable and sleeving assembly.
10. Remove one of the Truarc circlips of the pin from the end of the Leg Section mechanism rod and remove the pin. Recover the spacers.

11. Remove one of the Truarc circlips from the pin at the base of the Leg Section mechanism and remove the pin while supporting the mechanism. Recover the spacers.
12. Remove the Leg Section mechanism from the bed and continue the procedure on a workbench.
13. With the 4mm Allen key, unscrew but do not remove the screw securing the sleeving stop flat (B) (see figure 1).

    Note: the sleeving runs between the stop flat (B) and the top of the slide (A) (see figure 1).

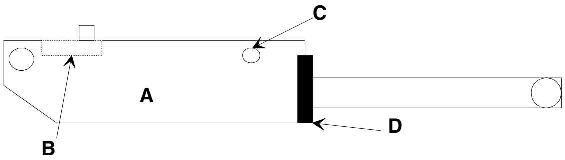


Figure 1 1512A440.wmf

14. With the 4mm pin-punch and the hammer, remove the pin (C) located on the side of the Leg Section slide (A) (see figure 1).
15. With the small flat blade screwdriver and the hammer, remove the slot (D) from the mechanism (see figure 2) and pull the assembly to access the catch. The spring (H) decompresses when the slot (D) is removed from the slide (A).

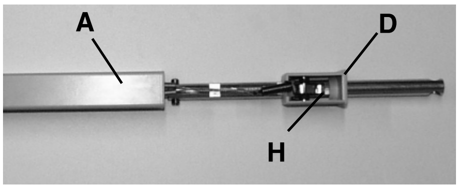


Figure 2 1512A441.tif

16. Note down the position of the catch (F) + spring (H) assembly (see figure 3) then, with the small flat blade screwdriver, drive out the guide (E) securing the catch (F) + springs (G) and (H) assembly (see figure 3) on the slot (D) and remove the slot assembly.

    Note the position of the spring (H) with respect to the catch (F) (see figure 4).

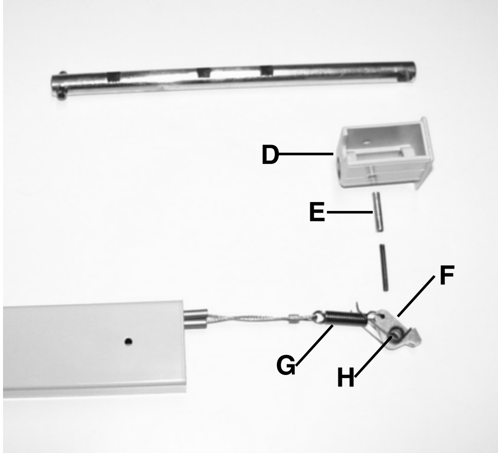


Figure 3 1512A442.tif

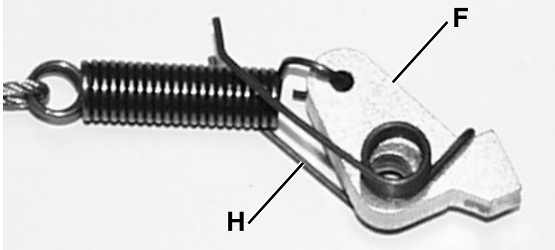


Figure 4 1512A439.tif

17. With the needle nosed pliers, bend back the tip of the spring (G) (see figure 3) (bent to prevent the spring escaping from its housing) and remove the spring from the catch.
18. With the small flat blade screwdrivers, separate the spring (G) (see figure 3) from the lined control cable.

Installation

1. Perform steps 18 to 5 of the removal procedure in reverse order.
2. Perform the “Adjustment” procedure of the following section from step 3.
3. Perform steps 4 to 1 of the removal procedure in reverse order.
4. Perform the "Function Checks" on page 2-3 of this manual.

Adjustment

1. Check that the cable common to both Leg Section controls is in good condition.
2. With the 4mm Allen key, loosen the screw securing the sleeving stop flat (see figure 1 of the removal procedure) and slacken the sleeving.
3. Pull the sleeving/cable assembly from the Leg Section sleeving until the Leg Section control levers touch their support.

4. Once the levers touch the support, tighten and block the sleeving stop screw using the 4mm Allen key.

   CAUTION: there must be no pull on the release spring when the stop screw is locked.

   Note: if the Leg Section is raised manually from the low position without operating the levers, a “click” must be heard when it passes a notch.

4.24) Extension replacement

Tools required:	1 x 5mm Allen key
	1 x 10mm open end wrench
	1 x 17mm open end wrench
	1 multigrip pliers
	1 med. Phillips head screwdriver

Removal

1. Apply the brakes, then adjust the bed to its high position, set the Leg and Foot Sections flat and the side-rails to low position.
2. Put the extension in its stored position and the Leg Section in high position.
3. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Technical staff may be injured if the bed is not disconnected from its power supply.

4. Remove the hard surfaces of the bedframe footend.
5. With the medium Phillips head screwdriver, unscrew and remove the screw connecting the extension ground wire to the bedframe.
6. With the 17mm open end wrench, loosen the screw securing the Trendelenburg/Reverse Trendelenburg cable and free the cable by operating the lever.
7. With the 10mm open end wrench and the multigrip pliers, remove the plastic spacer of the Trendelenburg/Reverse Trendelenburg cable adjuster, then the adjuster + cable sleeving assembly of the Trendelenburg/Reverse Trendelenburg lever support, and free the extension lever sleeving.
8. With the 5mm Allen key, unscrew and remove the 4 screws (A) securing the extension (see figure 1).

   Note: the screws are mounted with a medium locking compound.

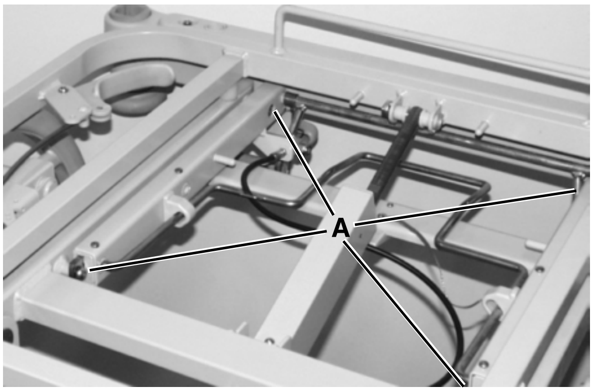


Figure 1

9. Slightly lift the extension and remove it from the bed by pulling horizontally away from the bed. Continue the procedure on a workbench.
10. Operate the extension control lever and remove the two extension slide bars.

    Note: the two slide bars are lubricated with medical grease.

    Note: the side of the slide bars with several holes faces inwards on the bed; in addition, the first hole is slightly apart and points to the bottom of the bed.
11. With the medium Phillips head screwdriver, remove the four screws securing the two extension lever bearing-assemblies and remove the lever and its bearing assembly.
12. With the med. Phillips head screwdriver, remove the eight screws securing the four extension pads.

Installation

1. Perform the removal procedure in reverse order, then “**adjust**” the Trendelenburg/Reverse Trendelenburg cable, referring to the “**adjustment**” section of procedure 4.12 (Trendelenburg/Reverse Trendelenburg cable replacement).
2. Perform the "Function Checks" on page 2-3 of this manual.

4.25) Variable Height pedal replacement

Tools required: 1 small flat blade screwdriver
1 med. Phillips head screwdriver
1 x 3mm Allen key
1 x 5mm Allen key
1 multigrip pliers
1 wire tie cutter

Removal

Note: the two pedals are connected by a cable and cannot be separated without being fully removed.

1. Apply the brakes, adjust the bed to its high position, then lay the HS and KS sections flat.
2. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed).

WARNING

Electric current passes through the connectors when the bed is switched on. Technical staff may be injured if the bed is not disconnected from its power supply.

3. Put the headend side-rails in intermediate position.
4. With the 3mm Allen key unscrew and remove the four screws securing the headend and footend covers of the bed. Recover the washers.
5. Remove the headend cover of the bed.
6. Tip the footend cover of the bed onto its side.
7. With the 3mm Allen key, unscrew and remove the two screws securing the junction box (A) at the footend of the chassis (see figure 1).

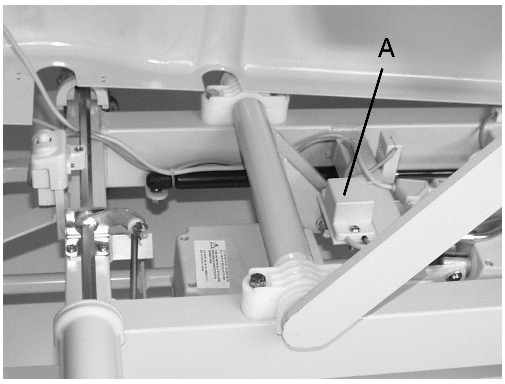


Figure 1 1512A418.tif

8. Note down the position of the cables (see figure 2), then remove the printed circuit from the junction box.

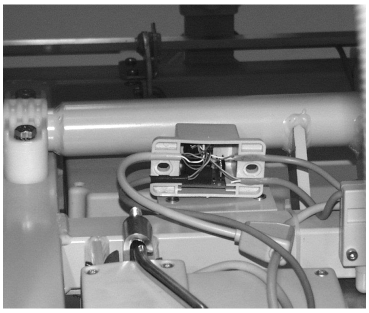


Figure 2 1512A444.tif

9. Unplug the connector corresponding to the VH pedals, connected to C1, C2 or C3 on the printed circuit (see figure 3).

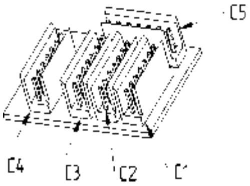


Figure 3 1512A406.tif

10. With the small flat blade screwdriver, open the chassis cable track through which the righthand VH pedal cable (viewpoint of a patient lying down) passes.
11. Remove the cable from the cable track.
12. With the wire tie cutter, cut the two plastic cable ties attaching the lefthand pedal cables to the chassis.

    Note: the pedal with two cables is on the lefthand side of the bed (viewpoint of a patient lying down).
13. Move the VH pedal cables, then reposition the footend cover horizontally in order to place the cables on it (see figure 4).

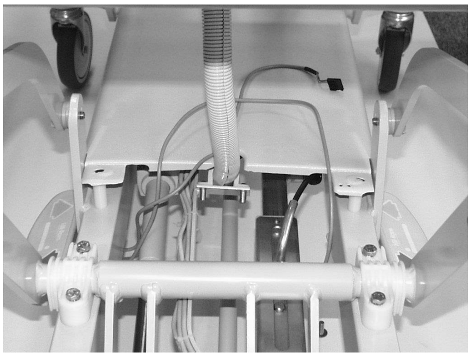


Figure 4 1512A445.tif

14. With the 5mm Allen key, remove the two screws (A) securing the righthand pedal and place it on the footend cover after moving it between the longitudinal tube of the chassis and the Trend./Rev. Trend. mechanism. Recover the washers (B) (see figure 6).
15. With the 5mm Allen key, remove the two screws (A) securing the lefthand pedal and place it on the ground. Recover the washers (B) (see figure 6).

    Note: lock washers are used and should be replaced when installing the pedal.
16. Plug the bed into the mains supply then set the VH function lock-out switch to the "unlocked" position (padlock open).
17. Operate the VH lower function until the bed reaches mid-height, then remove the lefthand pedal by passing it between the longitudinal tube of the chassis and the Variable Height motor (adjust the bed height if necessary).
18. Continue the procedure on a workbench if the switches are to be replaced.

Removal of Variable Height pedal electric wiring

Additional tools: 1 multigrip pliers
1 wire stripper
1 electrician's knife
1 soldering iron

Note: the wiring is supplied with the switches already mounted.

1. Follow the entire removal procedure for the Variable Height pedals.
2. Lay the pedals upside down on a workbench.
3. With the Phillips head screwdriver, unscrew the screw (C) securing the slot on each pedal (see figure 6).
4. Turn over the pedals then remove the central pin (D) securing the upper section (E) (see figure 5) using the multigrip pliers for both pedals.

    Note: the central pin (D) has an off-centre groove for shift movement. The shortest part of the pin must be directed towards the inside of the pedal when being installed.

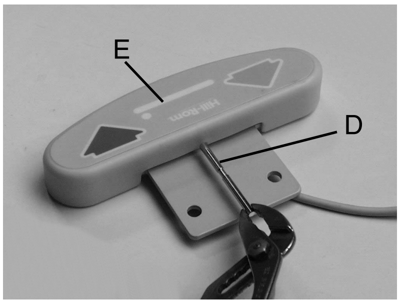


Figure 5 1512A446.tif

5. Remove the upper section (E) of each pedal (see figure 5).
6. On each pedal, with the Phillips head screwdriver, unscrew the 2 screws (F) securing the spring leaf (G) pressing on the switches (see figure 6).

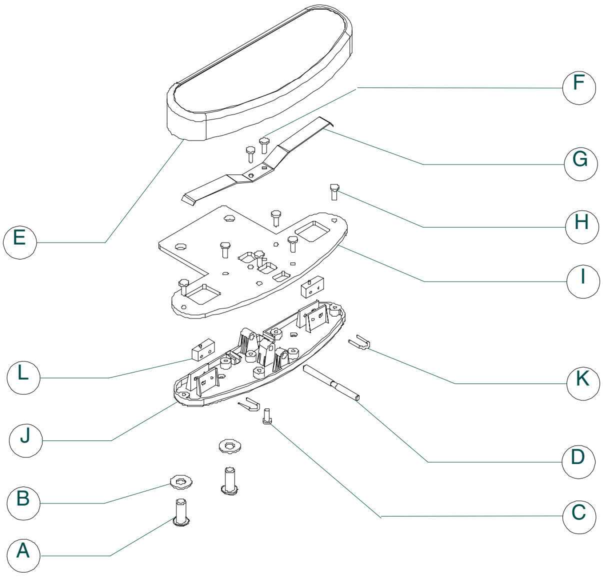

F
G
H
I
E
L
J
B
A
K
D
C

Figure 6 1512A447.wmf

7. With the Phillips head screwdriver, unscrew the 6 screws (H) securing the underside of each pedal (J) (see figure 6).
8. Remove the metal support (I) of the pedals to access the socket containing the switches (see figure 6).
9. Remove the pins (K) securing the switches (L) to the socket (see figure 6).
10. Note down the position of the wiring (see figure 7), then remove it from its housing.

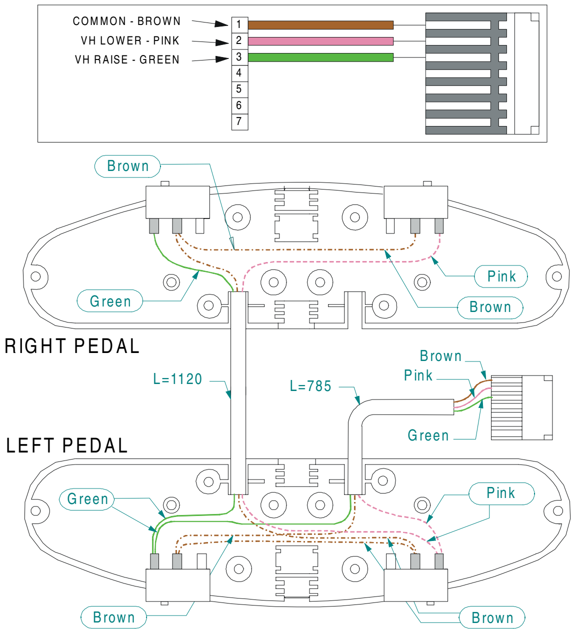

COMMON - BROWN
VH LOWER - PINK
VH RAISE - GREEN
1
2
3
4
5
6
7
Brown
Green
Pink
Brown
RIGHT PEDAL
L=1120
L=785
Brown
Pink
Green
LEFT PEDAL
Green
Pink
Brown
Brown

Figure 7 1512_448.wmf

Installation of pedal electric wiring

1. Perform the removal procedure in reverse order. Make sure the wires are connected properly in the right positions (see figure 7).
2. Perform the "Function Checks" on page 2-3 of this manual.

4.26) Bedside Cabinet support rails replacement

Tools required: 1 x 5mm Allen key

Removal

1. Apply the brakes, adjust the bed to its high position, then ensure the Leg and Foot Sections are horizontal and the siderails are in the high position.
2. Remove the headboard.
3. Raise the Head Section to at least 50°.
4. Unplug the bed from its power supply. If the bed has a battery, put the lock-out switches to their "locked out" position (padlock closed)..

WARNING

Technical staff may be injured if the bed is not unplugged from its power supply.

3. With the 5mm Allen key, unscrew and remove the 6 screws (A) securing the rails (B) (see figure 1)

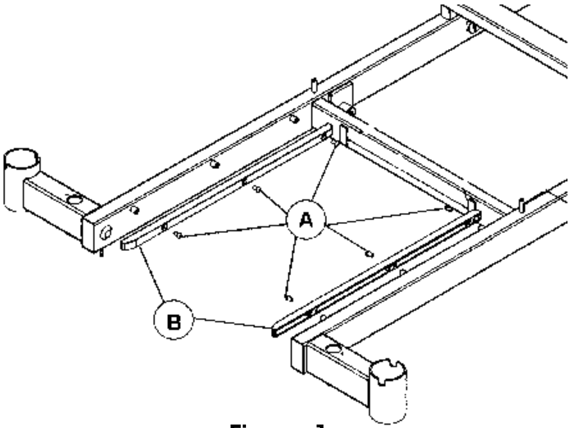


Figure 1 1512A449.tif

Installation

1. Perform the removal procedure in reverse order.
2. Perform the "Function Checks" on page 2-3 of this manual.

Notes:

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Ordering Service Parts

Use the parts list in this manual to identify the part numbers you require.

Call the after sales service of your national Hill-Rom representative (refer to the last page of this manual). To help expedite the processing of your parts order, please have your customer account number, purchase order number, product number and serial number of the bed when you call.

> **Note:** You will find the product number and serial number on the product identification label located at the headend of the bed on the chassis, see pages 1-11 and 5-61.

For your convenience, a fax number is available for ordering parts, requesting prices or chasing up an order: refer to the last page of this manual.

Postage will be invoiced for orders below FF150.

Delivery:

- 48 hours if parts are available.
- Postage paid dispatch.
- Dispatch chargees are included in the price of the parts.
- Parts to be manufactured have a delay of 3 weeks.

Please address all orders to your National Hill-Rom representative (refer to the last page of this manual).

For: Technical support - parts

Exchange policy

In-warranty exchanges

Out-of-warranty exchanges

In-warranty exchanges

Hill-Rom will request that certain defective parts be systematically returned for assessment.

In certain cases, the invoice sent with the parts will show the full selling price of the parts. This is for Hill-Rom's internal use only and should not be confused with the price you will actually pay.

Recommended Spare Parts

List of recommended spare parts for 10 Evolution beds over 3 years:

Description	Qty
I/O touchpad for righthand side-rail	1
I/O touchpad for lefthand side-rail	1
Power Unit	1
Variable Height Motor	1
Head Section Motor	1
Knee Section Motor	1

1512Atbl_500

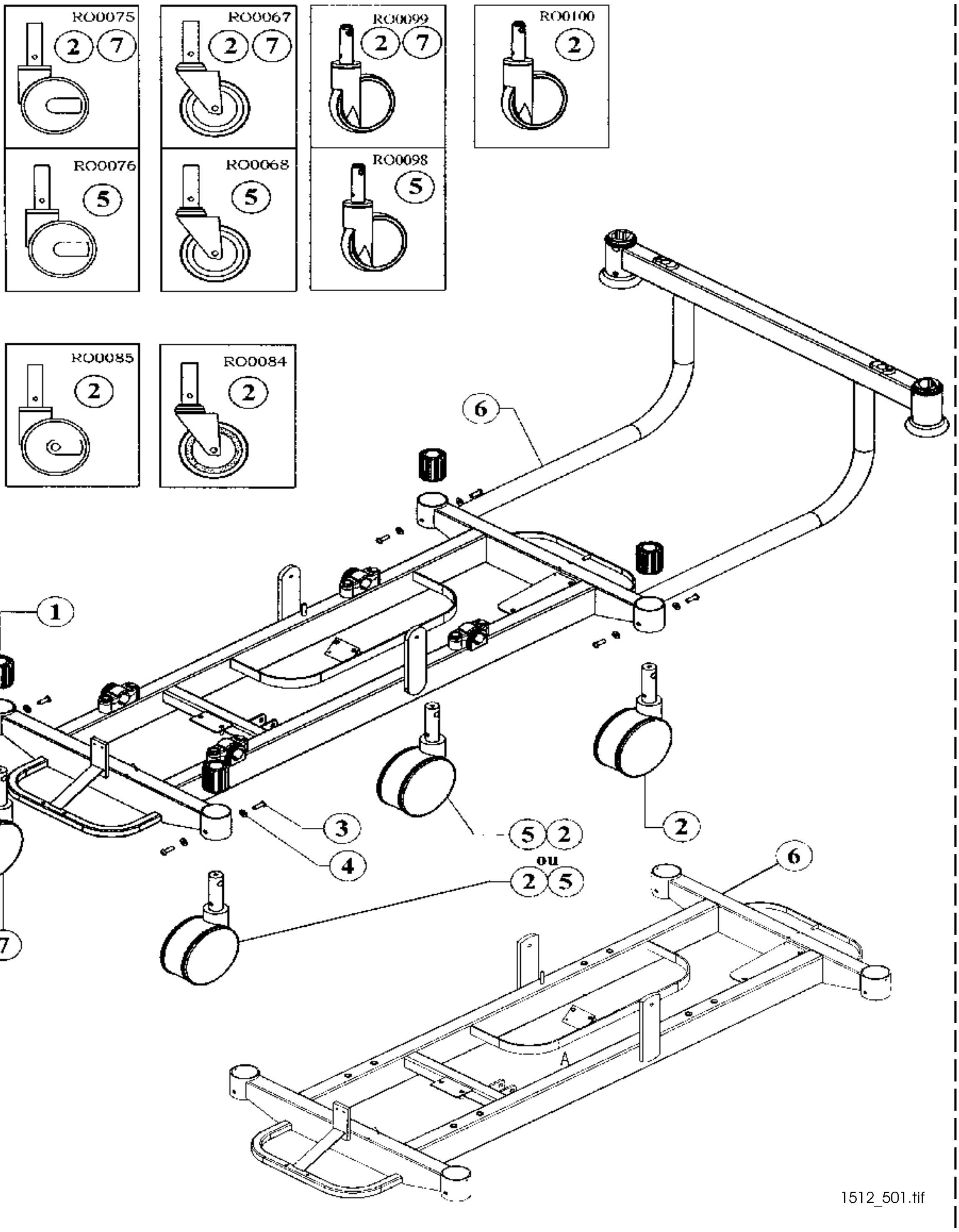
Strongly recommended accessory for troubleshooting on the LI156Ex: hand pendant test control unit: QD0534 (can be used on all models).

5.1 Castors

No.	Qty	Reference	Description
1	4	S30246	CASTOR SUPPORT
4	8	VI0372	CONTACT WASHER 8x+F21718 Z.B
3	8	VI0484	BHC SCREW M8x25 Z.B
6	1	LTZ200 MB	156E SH CHASSIS + INSERTS
or	1	LTZ203 MB	156E HSH CHASSIS + INSERTS
CASTOR DIA.:150 SINGLE WHEEL			
2 - 7	3	RO0067	CAST. 2476 PJX 150 R26 LN48
5	1	RO0068	CAST. 2474 PJX 150 R26 LN48 (STEER)
K.M. CASTOR DIA.:150 TWIN WHEEL			
2 - 7	3	RO0075	CAST. D:150 TWIN WHEEL BEIGE
5	1	RO0076	CAST. D:150 TWIN WHEEL STEER BEIGE
CASTOR DIA.:150 ANTISTATIC SINGLE WHEEL: (BATTERY OPTION)			
7	1	RO0067	CAST. 2476 PJX 150 R26 LN48
5	1	RO0068	CAST. 2474 PJX 150 R26 LN48 (STEER)
2	2	RO0084	CAST. D:150 PJX ANSTATIC BEIGE
CASTOR DIA.:150 ANTISTATIC TWIN WHEEL: (BATTERY OPTION)			
7	1	RO0075	CAST. D:150 TWIN WHEEL BEIGE
5	1	RO0076	CAST. D:150 TWIN WHEEL STEER BEIGE
2	2	RO0085	CAST. D:150 TWIN WHEEL ANSTATIC BEIGE
CASTOR DIA.:150 "INTEGRAL"			
2 - 7	3	RO0099	CAST. 2046 UAP 150 R26-289 LN48
5	1	RO0098	CAST. 2044 UAP 150 R26-285 LN48 (STEER)
CASTOR DIA.:150 ANTISTATIC "INTEGRAL"			
7	1	RO0099	CAST. 2046 UAP 150 R26-289 LN48
5	1	RO0098	CAST. 2044 UAP 150 R26-285 LN48 (STEER)
2	2	RO0100	CAST. 2046 XSP 150 R26-285 LN48

Note: Castors 2 and 5 are reversed for the footend steering castor option.

1512Atbl_501


RO0075
2
7
RO0067
2
7
RO0099
2
7
RO0100
2
RO0076
5
RO0068
5
RO0098
5
RO0085
2
RO0084
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6
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3
4
5 2
ou
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1512_501.tif

5.2 Single Brake

No.	Qty	Reference	Description
1	2	QD0529	PLASTIC WASHER D:8x15 TH.:3
2	2	S20499	SINGLE BRAKE PIN
3	2	S20764	SS EMERGENCY BRAKING CONNECTING ROD
4	1	QD1316	EMERGENCY BRAKING PEDAL LABEL
5	1	S30248	BEIGE EMERGENCY BRAKING PEDAL COVER
6	2	S20867	EMERGENCY BRAKING SQUARE BRACKET
7	3	S30439	SINGLE BRAKE BEARING ASSEMBLY
8	1	S30279	GREEN EMERGENCY BRAKING PEDAL COVER
9	4	VI0418	METAL SCREW NO.10x13 CBL Z.B
10	6	VI0371	WASHER 6x12 Z.B
11	2	VI0545	BHC LOCKSCREW M6x16 10/9 Z.B
12	4	VI0514	POZIDRIVE METAL SCREW NO.14x19 Z.B
13	2	S30198	HEXAGON TUNNEL GUIDE BUSH
14	4	S30432	HEXAGON BAR COVER 156C
15	2	LT0962	SINGLE BRAKE HEXAGON BAR
16	4	VI0488	TRIGOB SCREW FZ M4x10 Z.B
17	1	LT0963 MB	SINGLE BRAKE PEDAL
18	4	QD1122	SKIFFY PLUG
19	2	VI0040	CHC SCREW M6 x 40 ZB
20	2	VI0159	NYLSTOP LOCKNUT HM6 ZB

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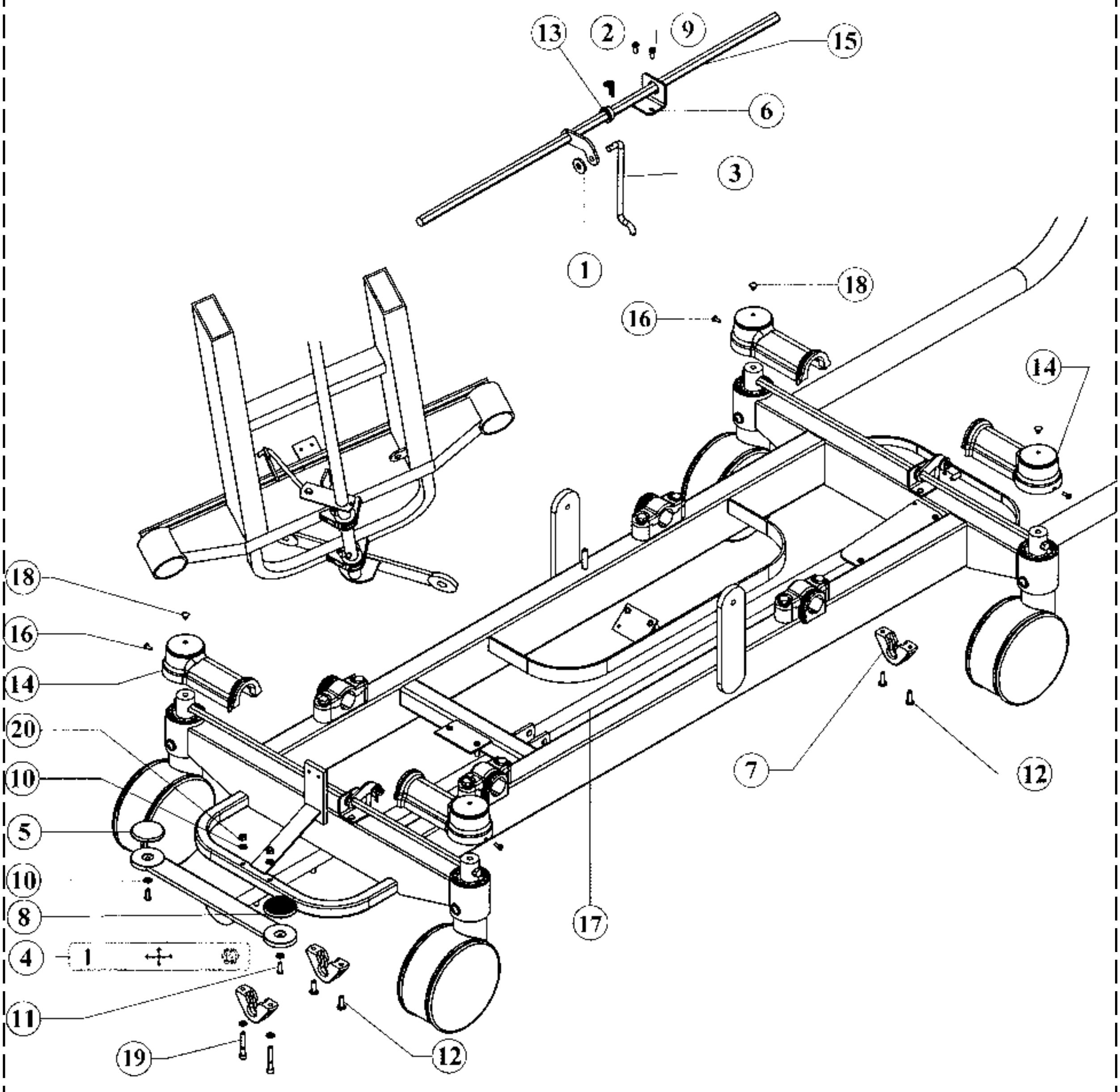
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5.3 Power Supply

No.	Qty	Reference	Description
1	1	QD1466	CB09 UNIT 110V/120V
or	1	QD1467	CB09 UNIT 110V
or	1	QD1457	CB09 UNIT 220V/240V
2	1	QD1458	POWER SUPPLY CABLE (EUROPE)
or	1	QD1459	POWER SUPPLY CABLE (GB)
or	1	QD1460	POWER SUPPLY CABLE (SWITZERLAND)
or	1	QD1461	POWER SUPPLY CABLE (GERMANY)
or	1	QD1463	POWER SUPPLY CABLE (USA)
3	2	S30363	STRAIN-RELIEF
4	4	VI0093	PANHEAD METAL SCREW NO.10*32 Z.B
5	2	VI0464	BHC SCREW M5*16 Z.B.
6	10	QD0404	STRAP 186 - 210
7	1	QD0808	SES STRAP 380/47 SL HT-C NAT
8	1	S30454	JUNCTION BOX
9	2	VI0464	BHC SCREW M5*16 Z.B.
10	1	QD1583	PRINTED CIRCUIT
11	2	VI0390	WASHER 5x12 Z.B
12	1	QD0557	LINAK BATTERY
13	4	VI0464	BHC SCREW M5x16 Z.B
14	4	VI0370	NYLSTOP LOCKNUT SB M5 Z.B
15	2	VI0514	METAL SCREW NO.14x19 Z.B
16	2	F10103	BATTERY SUPPORT
17	1	Page 1-13	BATTERY LABEL 156
18	1	Page 1-13	BATTERY LABEL 156 FRENCH

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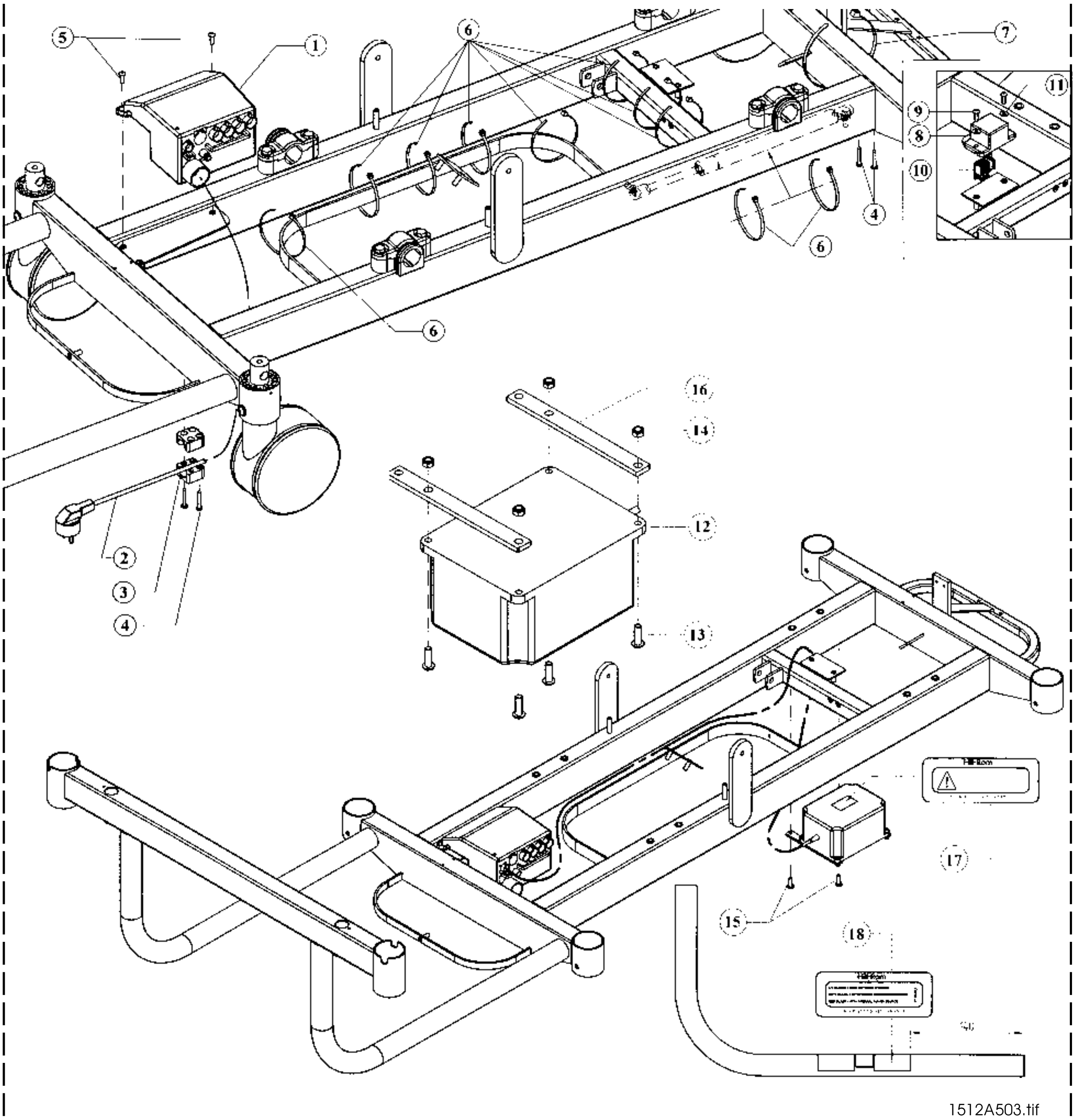
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5.4 Variable Height Power

No.	Qty	Reference	Description
1	2	QD0526	TRUARC CIRCLIPS 10 SPRINGFIX
2	2	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
3	2	S10822	MOTOR HEAD BUSH
4	1	S10555	KNEE SECTION MOTOR CLEVIS FASTENING PIN
5	1	S10667	TR/REV TR FOOT PIN MOTOR SPIGOT
6	1	VE0117	VH MOTOR
7	1	S20905	VH MOTOR REINFORCEMENT WIRE
8	1	S20906	VH MOTOR REINFORCEMENT
9	2	VI0367	NYLSTOP LOCKNUT M8 S.B. Z.B.
10	2	VI0372	CONTACT WASHER 8*18 ZB

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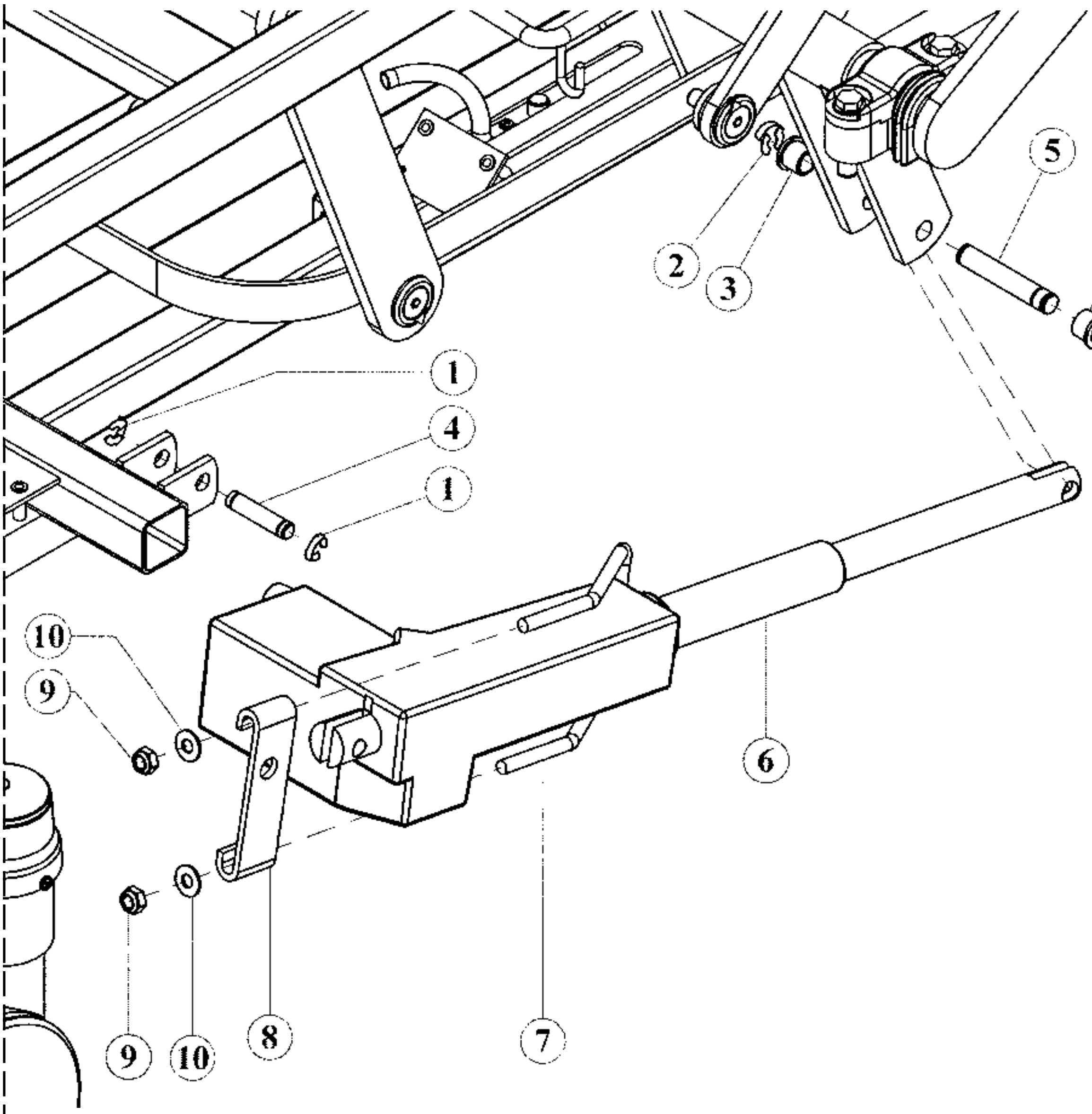
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5.5 Simple Variable Height: connector

No.	Qty	Reference	Description
1	1	LT1305	SINGLE VH CONNECTING ROD 156E
2	1	S10737	PIN DIA.:12 L:79 USEFUL LENGTH
3	2	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
4	2	S10822	SHOULDERED BUSH FOR PIN DIA.:12
5	1	S10668	TR/REV TR HEAD PIN
6	2	QD0526	TRUARC CIRCLIPS 10 SPRINGFIX
7	2	S10480	TR/REV TR PLASTIC BUSH
8	1	VE0021	LOM GAS SPRING 09465FI10200 F:115KG
9	1	VI0361	HEX. NUT M8 Z.B.
10	2	VI0372	CONTACT WASHER 8*18 Z.B.
11	1	LT1379	TRENDELENBURG SHUNT CONNECTOR

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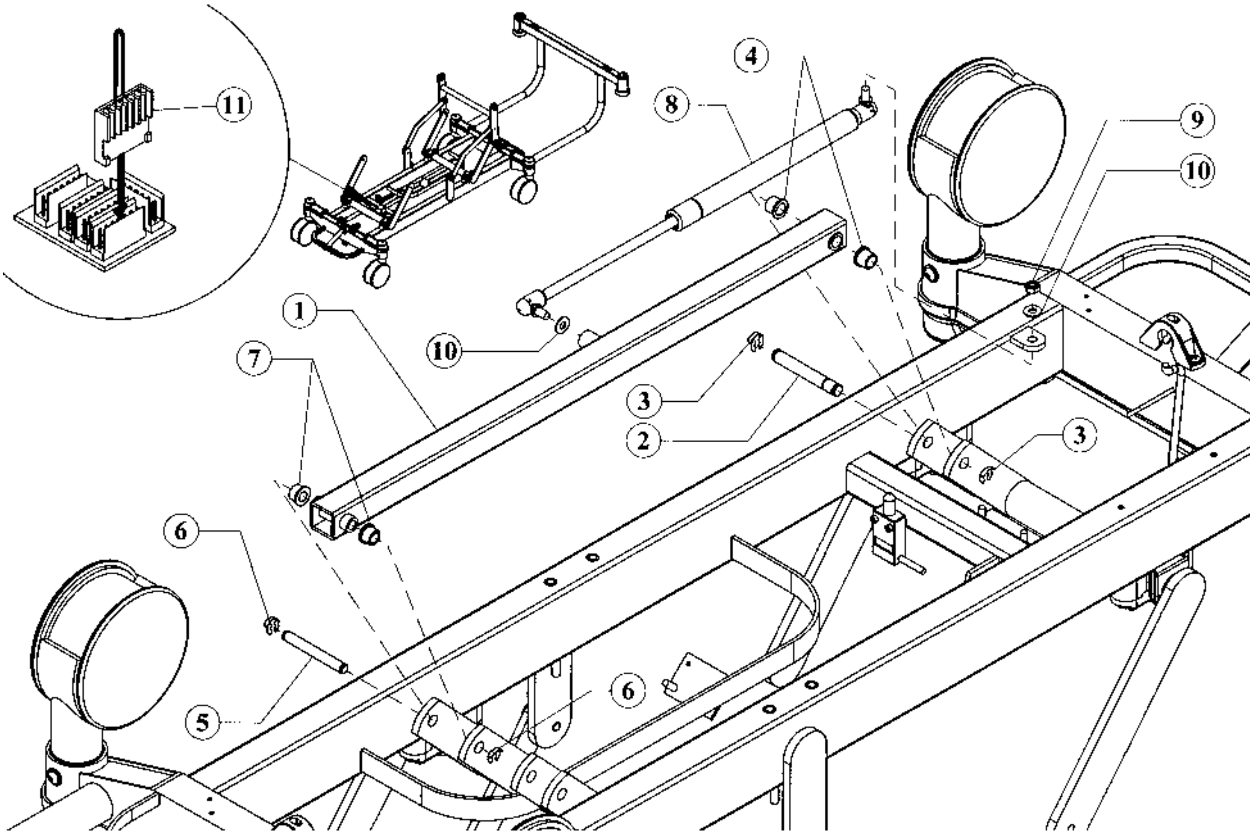
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5.6 Variable Height: Trendelenburg/Reverse Trendelenburg mechanism

No.	Qty	Reference	Description
1	1	LT0788	TRENDELENBURG/REVERSE TRENDELENBURG TUBE
2	1	S20414	TR/REV TR RELEASE PLATE
3	1	S20416	EUROLIT TR/REV TR SPRING
4	2	S30259	TR/REV TR SLIDE PAD
5	1	QD0402	SPLIT PIN 4x30
6	1	VE0021	LOM GAS SPRING 0953380310200 F:115KG
7	1	S20771	TR/REV TR SLIDE TUBE
8	1	QD0588	EXTENSION CABLE AND SLEEVING ASSEMBLY
9	4	VI0442	SCREW FOR PLASTIC DIA.3 L=6
10	1	S20415	TR/REV TR CATCH
11	1	LT0037	TR/REV TR RELEASE FRAME
12	1	VI0478	TRIGOB SCREW CB D4x8 Z.B
13	2	VI0372	CONTACT WASHER 8x18 Z.B
14	2	QD0526	TRUARC CIRCLIPS 10 SPRINGFIX
15	2	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
16	2	S10480	TR/REV TR PLASTIC BUSH
17	2	S10822	MOTOR HEAD BUSH
18	1	S10737	TR/REV TR FOOT PIN MOTOR SPIGOT
19	1	S10668	TR/REV TR HEAD PIN
20	1	VI0361	HEX. NUT M8 Z.B

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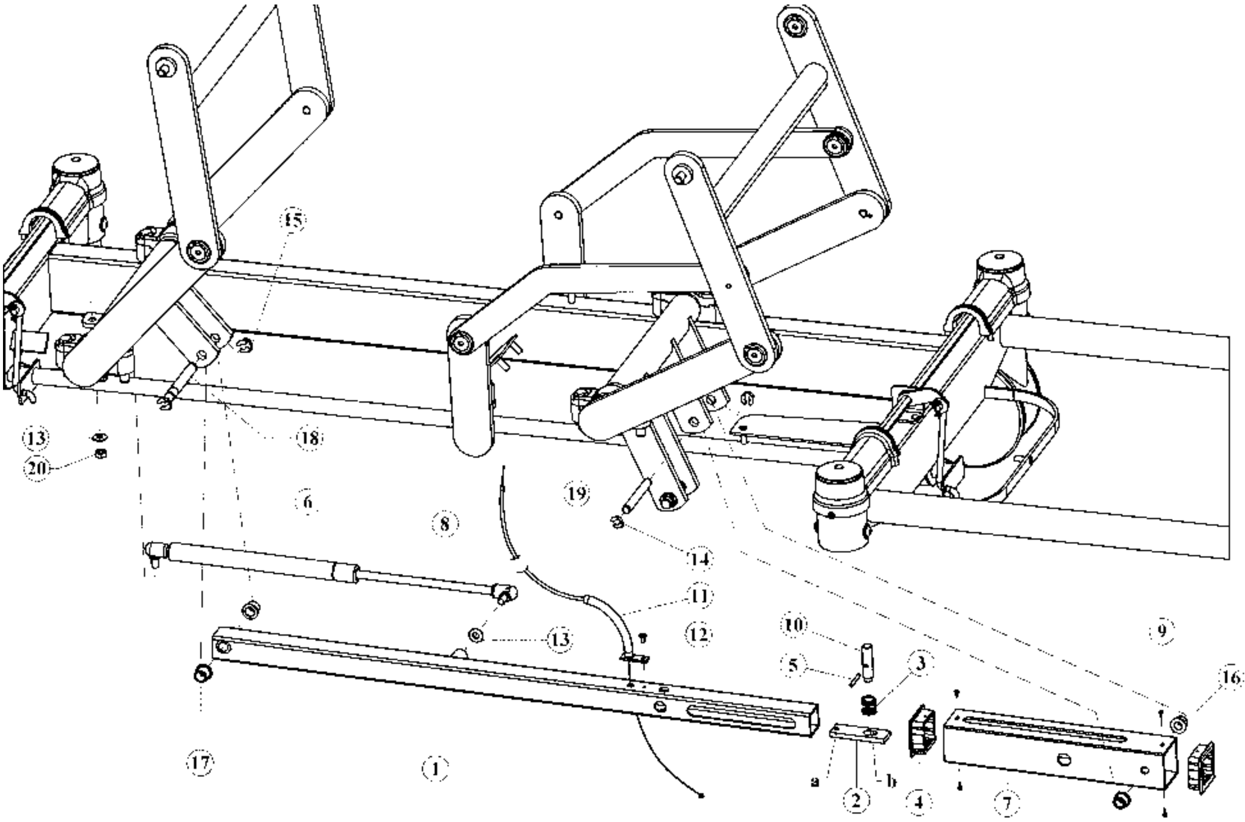
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5.7 Variable Height Pedal

No.	Qty	Reference	Description
1	1	QD1262	LABEL
2	2	S10875	PEDAL PIN
3	2	S20864	SWITCH BLADE
4	2	LTZ201 MB	PAINTED METAL PEDAL-SUPPORT
5	4	S20868	SWITCH PIN
6	2	S30452	PEDAL COVER
7	2	S30453	PEDAL BASE
8	18	VI0426	T45 PLASTIC SCREW CBL 4*10 Z.B.
9	4	VI0446	BHC SCREW M8*20 Z.B.
10	4	VI0372	CONTACT WASHER 8*18 Z.B.
11	1	F1Z012	CABLE TRACK TYPE LD3WH2M-A L=150mm
12	1	QD0404	STRAP 186 - 210
13	1	LTZ202	CABLE + CONNECTOR + SLEEVES

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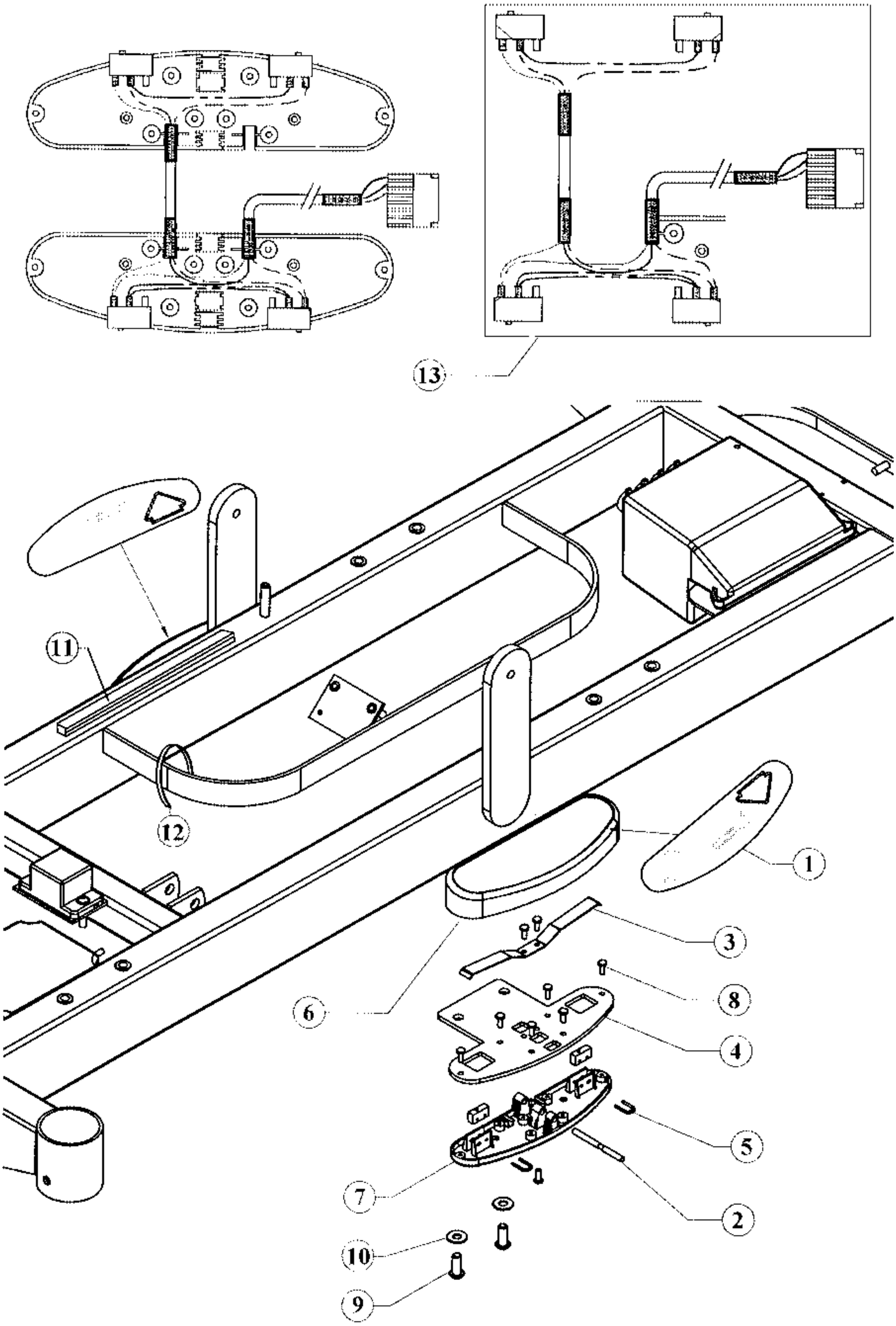
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5.8 End of Travel Switch Assembly

No.	Qty	Reference	Description
1	1	LTZ204	END OF TRAVEL ASSEMBLY
2	2	S10793	SPACER DIA.:4.2x16.5x20 (F/C)
3	2	VI0334	CHC SCREW M4*25 8/8 Z.B

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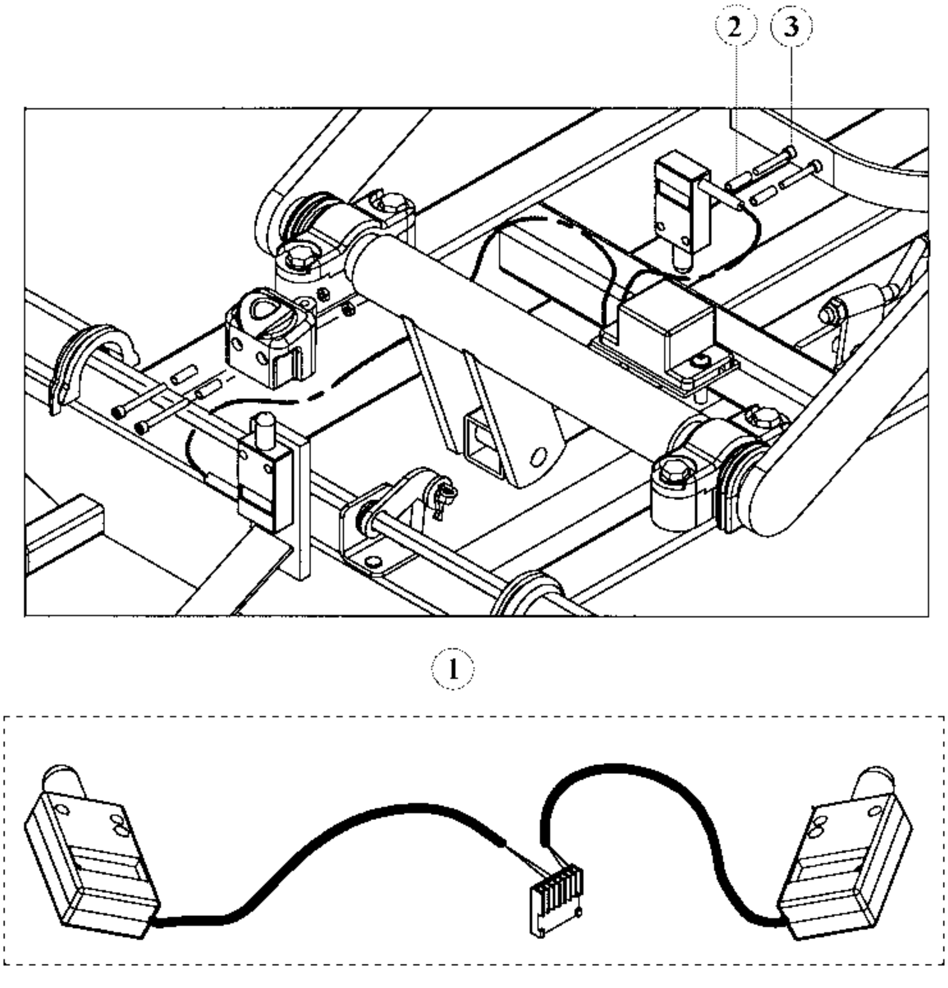

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5.9 Chassis covers

No.	Qty	Reference	Description
1	1	F10957	TVS EVOLUTION HEADEND COVER
2	1	LTZ205 MB	EVOLUTION FOOTEND COVER + LABELS
3	1	S30300	SWITCH SUPPORT
4	2	VI0359	HEX. NUT M4 Z.B
5	4	VI0390	WASHER 5x12 Z.B
6	2	S10793	SWITCH SPACER DIA.: 4.2 x 16.5 x 20
7	3	VI0464	BHC SCREW M5x16 Z.B
8	1	VI0453	BHC SCREW M5 x 10 ZB
9	2	VI0458	CHC SCREW 4x35 Z.B
10	2	S10704	HEAD SECTION RELEASE PLASTIC SPACER
11	1	Page 5-65 or 5-67	LOCK-OUT LABEL
12	1	LTZ206	T-CABLE + CONNECTOR
13	3	QD0562	LOCKOUT SWITCH. 2P K10000004

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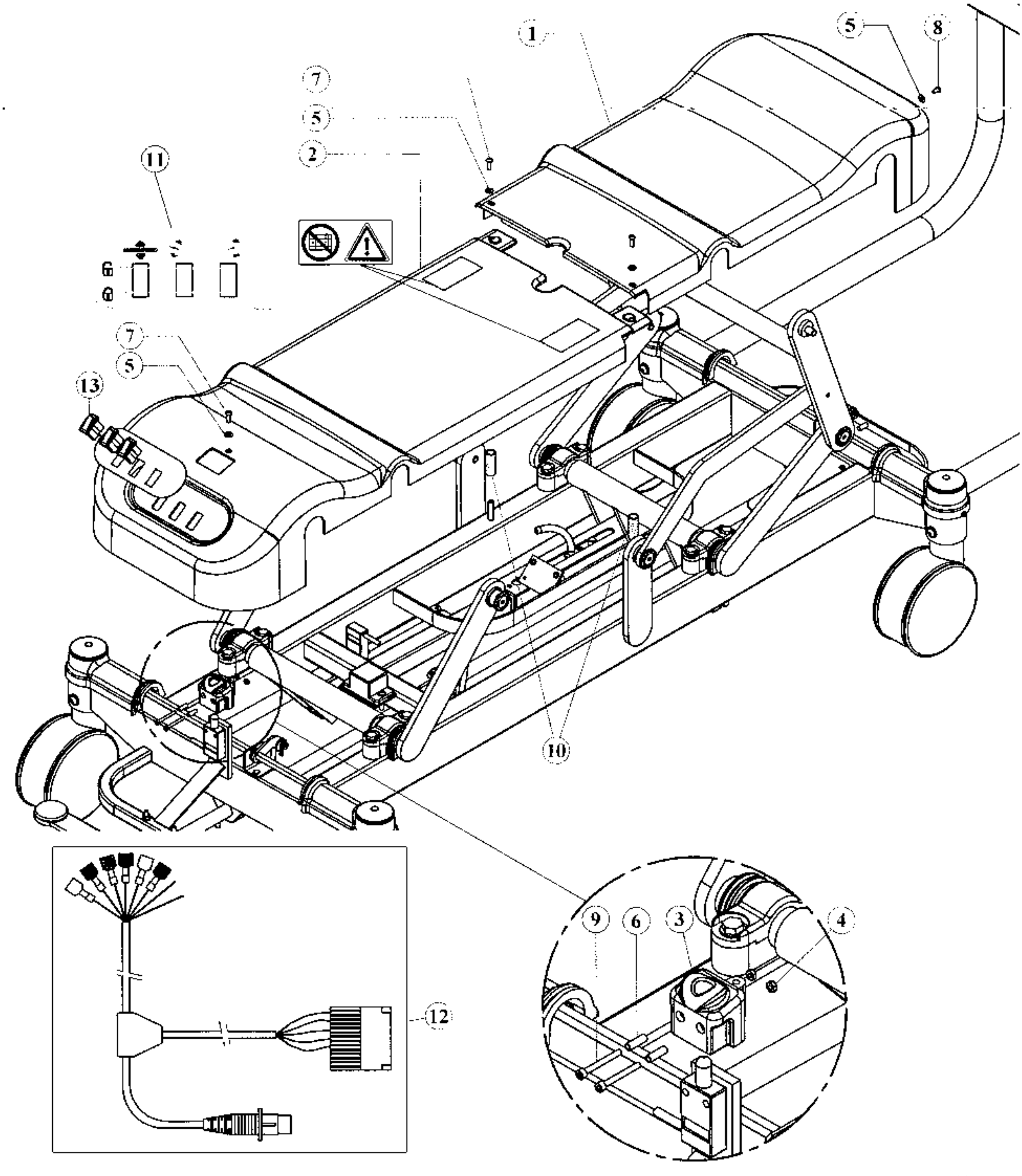
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5.10 Lift Arm

No.	Qty	Reference	Description
1	4	S30253	LIFT ARM LOWER BEARING ASSEMBLY
2	4	S30254	LIFT ARM UPPER BEARING ASSEMBLY
4	12	S30430	LIFT ARM BUSH SPACER
5	8	VI0020	HEX. SCREW M8x45 Z.B
6	8	VI0372	CONTACT WASHER 8x+F8718 Z.B
7	12	VI0501	FHC/90 10x35 LOCKSCREW
8	1	LT1304 MB	VH HEAD LIFT ARM LOWER ARM 156E
9	1	LT0752 MB	FOOT LIFT ARM LOWER ARM
10	1	LT0753 MB	HEAD LIFT ARM UPPER ARM
11	1	LT0754 MB	FOOT LIFT ARM UPPER ARM
12	2	F10325 MB	COMPENSATOR
14	12	QD0583	SPLIT PIN 3.5x18
BED WITH TRENDELENBURG/REVERSE TRENDELENBURG OPTION			
3	2	S30436	LIFT ARM BUSH + MARKING
13	10	S30429	LIFT ARM BUSH
BED WITHOUT TRENDELENBURG/REVERSE TRENDELENBURG OPTION			
3	2	S30429	LIFT ARM BUSH
13	10	S30429	LIFT ARM BUSH

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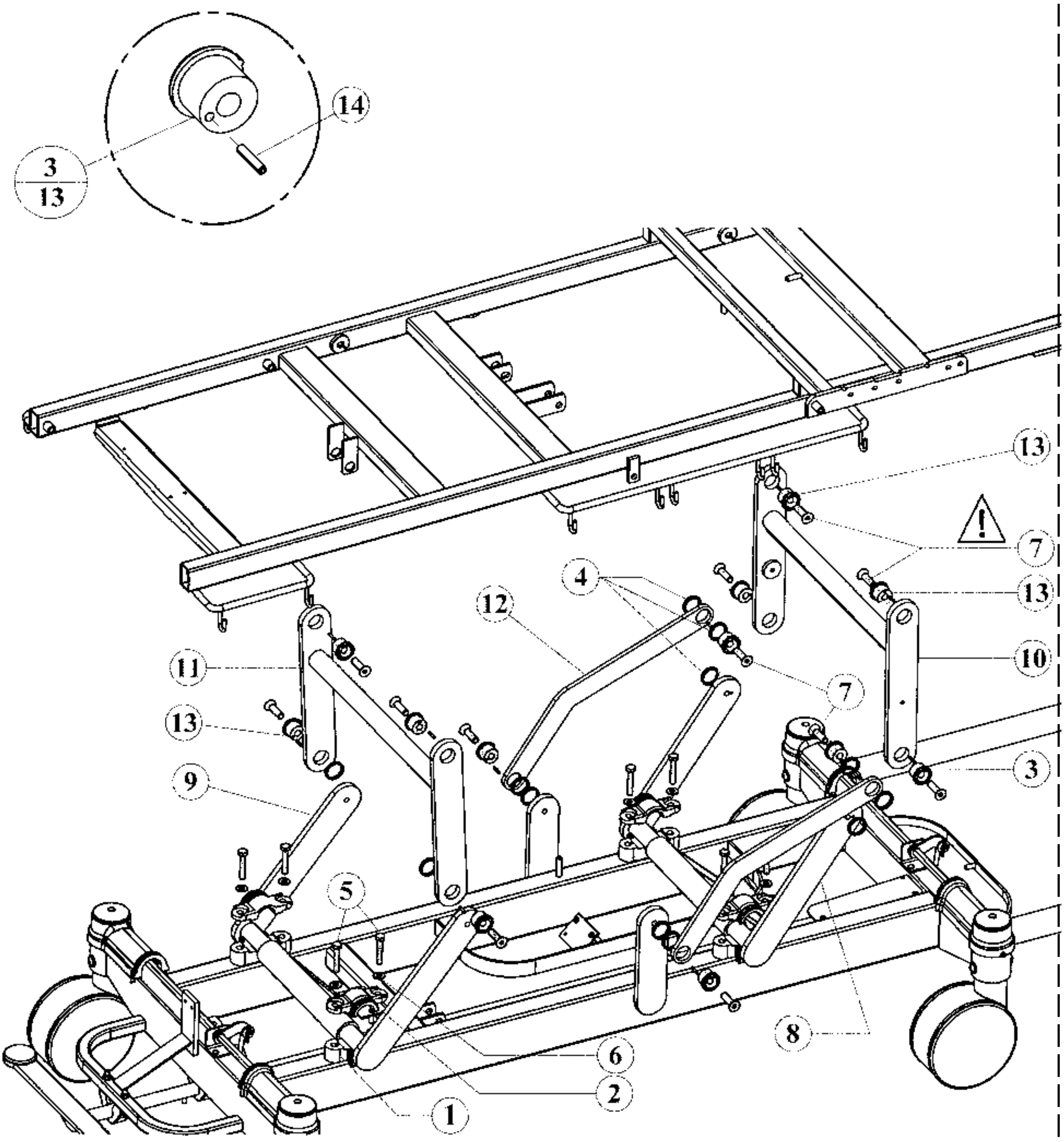
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5.11 Lift arm: conduit

No.	Qty	Reference	Description
1	1	QD0577B	CONDUIT L=650mm
2	2	S30360	CONDUIT STRAP
3	4	VI0464	BHC SCREW M5x16 Z.B

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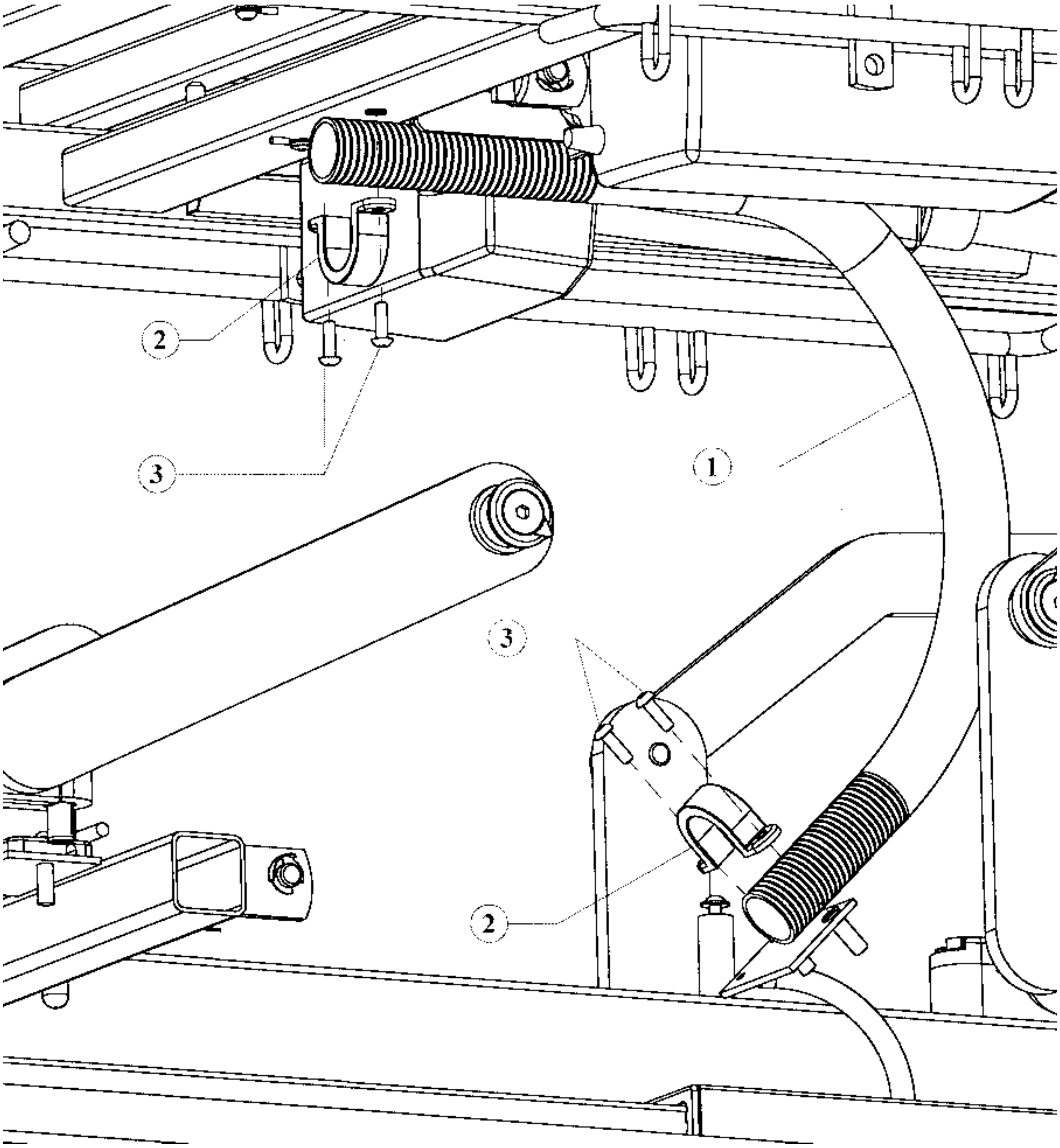

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5.12 Intermediate Section

No.	Qty	Reference	Description
1	2	QD0589	EAR 40x+F25927 H5 WHITE END-COVER
2	2	S10642	FRAME SUPPORT BUSH D30
3	1	S30257	RIGHTHAND SLIDE
4	1	S30260	LEFTHAND SLIDE
5	2	S30313	1 POSITION ACCESSORY HOLDER DIA.10
6	10	VI0371	WASHER 6x12 Z.B
7	2	VI0372	CONTACT WASHER 8x18 Z.B
8	10	VI0463	BHC SCREW M6x20 Z.B
9	2	VI0443	BHC SCREW M8x16 Z.B
10	1	LTZ207 MB	INTERMEDIATE FRAME + INSERTS
11	1	F1Z015	CABLE TRACK TYPE L LD3WH2M-A L=400mm
12	1	LTZ218 MB	156E SH INTERMEDIATE FRAME + INSERTS
13	2	S10809	PLASTIC BUSH. DIA./7.8*22 L=26
14	4	01126611	SIDE-RAIL SOCKET
15	1	Page 5-60	BUSH FR-POAG-S 4B1.071.01
16	1	Page 5-60	EQUIPOTENTIAL TERMINAL
17	2	01114611	BEDSIDE CABINET TRANSPORT MECHANISM
18	6	VI0344	BHC SCREW M6*10 Z.B.
19	2	00611111	ADHESIVE EDGING 16*3.5*35

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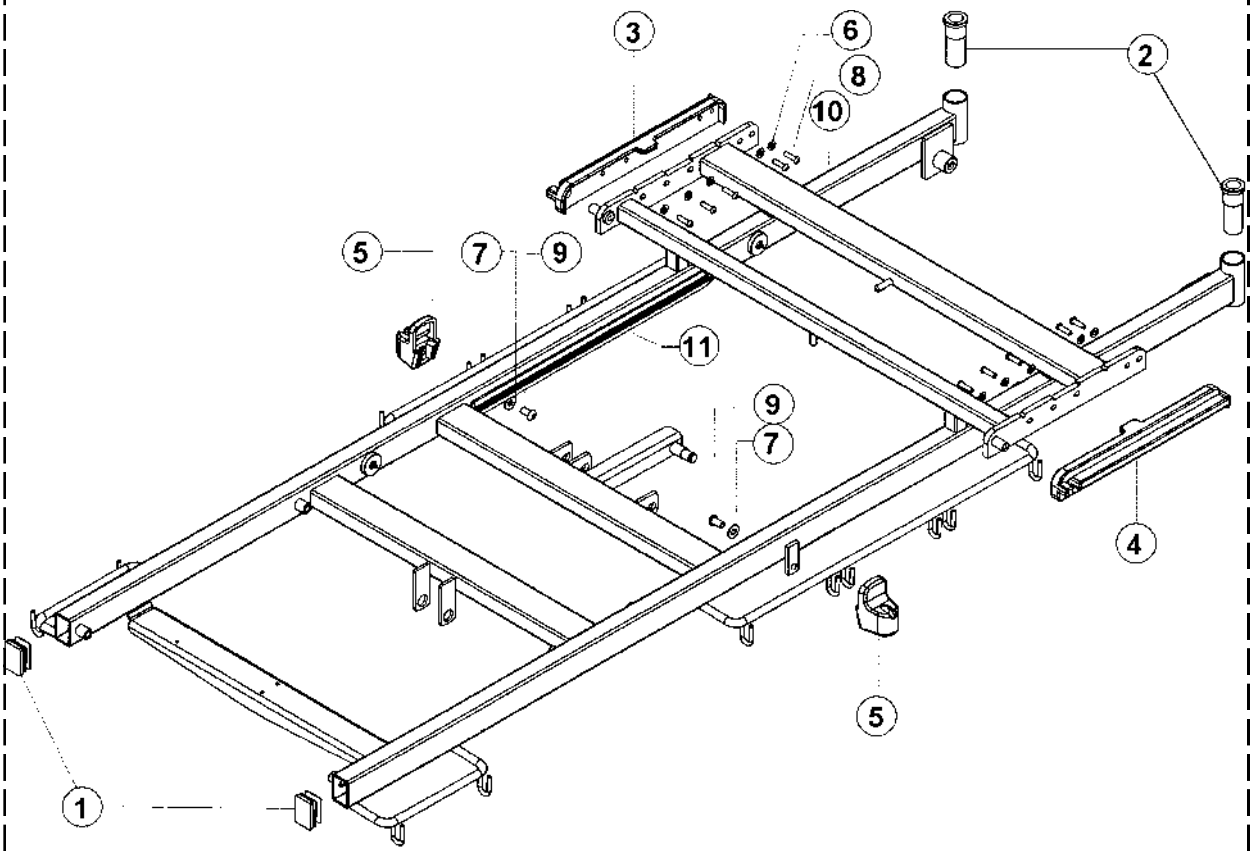
Symmetrical Headboard intermediate section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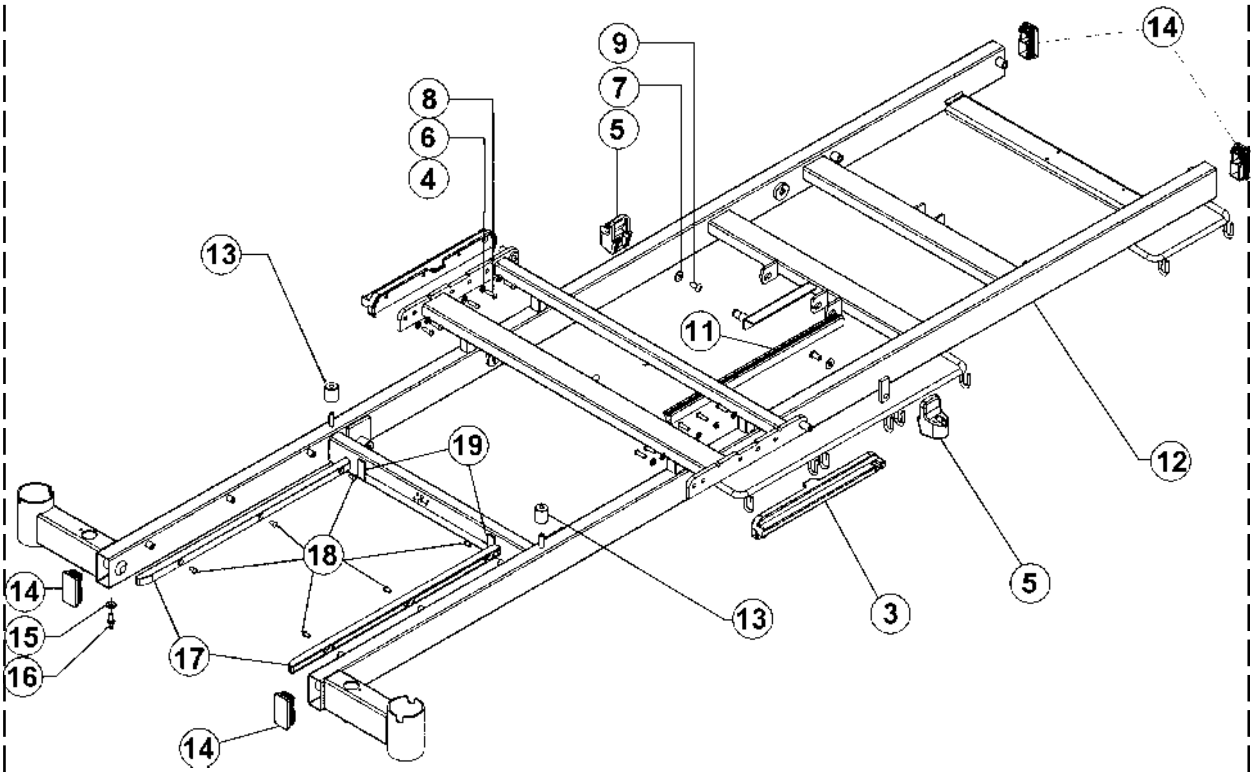
Horizontal Symmetrical Headboard intermediate section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5.13 Head Section Articulation and Release Lever

No.	Qty	Reference	Description
1	2	QD0583	SPLIT PIN 3.5x18
2	2	S10806	HEAD SECTION ARTICULATION BUSH
3	1	S30258	LEFTHAND HS/LS WHEEL
4	1	S30262	RIGHTHAND HS/LS WHEEL
5	4	S30429	LIFT ARM BUSH
6	4	S30430	LIFT ARM BUSH SPACER
7	2	VI0208	HC SCREW M6*6 NOTCHED CURVED
8	2	VI0368	NYLSTOP LOCKNUT H M10 Z.B
9	4	VI0501	FHC/90 10x35 LOCKSCREW
10	1	LT1303 MB	HEAD SECTION
11	1	LT0811 MB	HEAD SECTION ARTICULATION CONNECTING ROD
12	1	S10499	HS/LS LEVER BUSH
13	1	S30282	RELEASE LEVER
14	1	VI0208	HC SCREW M6x6 NOTCHED CURVED Z.B
15	1	VI0344	BHC SCREW M6x10 Z.B

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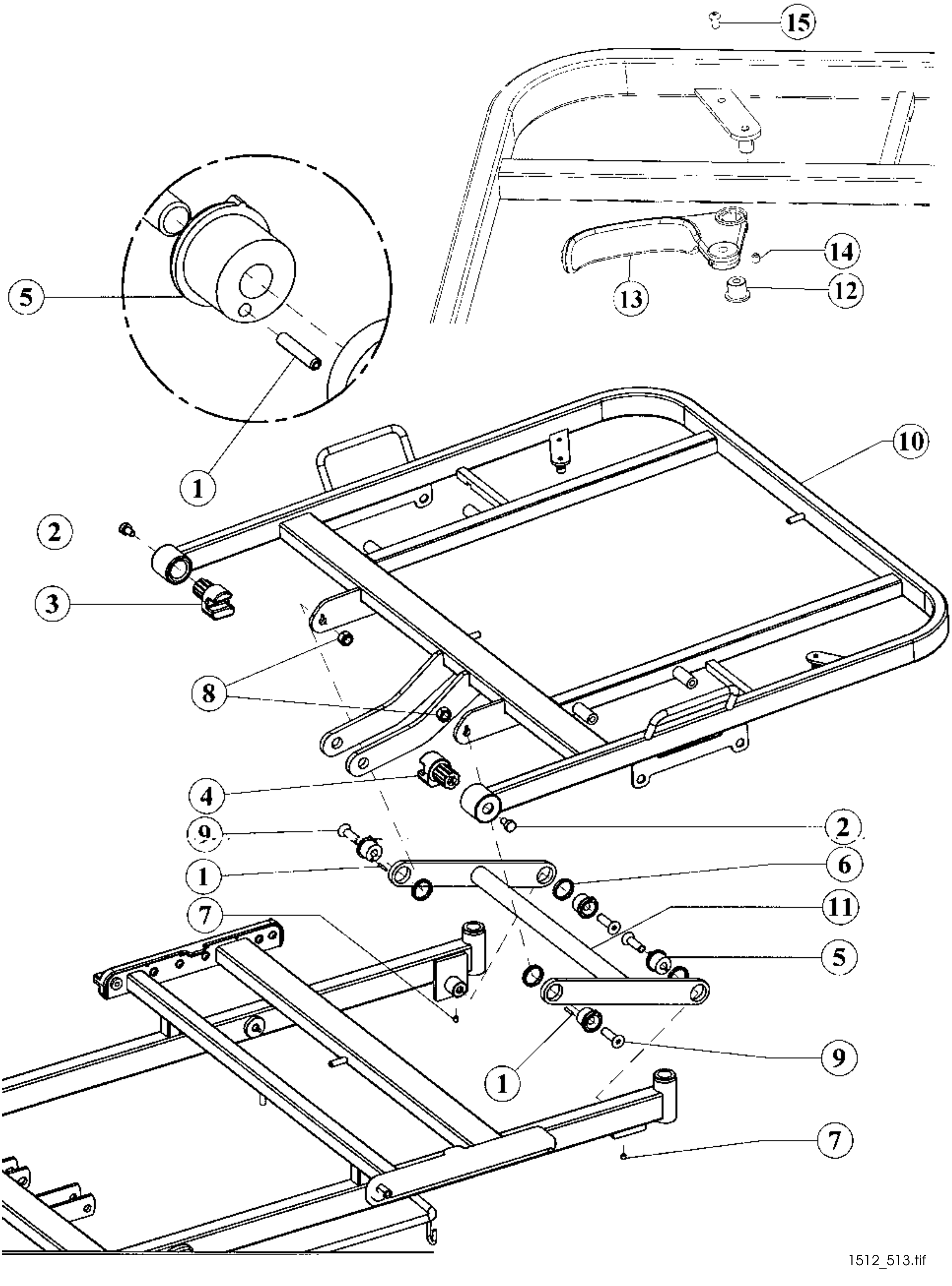
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5.14 Knee Section

No.	Qty	Reference	Description
1	2	S10501	KNEE SECTION ARTICULATION BUSH
2	2	S10502	KNEE SECTION ARTICULATION SPACER
3	2	S10805	KNEE SECTION ARTICULATION SCREW
4	4	S10809	PLASTIC BUSH DIA.: 7.8x22 L=26
5	1	S30258	LEFTHAND HS/LS WHEEL
6	1	S30262	RIGHTHAND HS/LS WHEEL
7	2	VI0516	BHC M8x16 10/9 LOCKSCREW Z.B
8	1	LT1302 MB	KNEE FRAME
9	1	LT0778 MB	LEG SECTION

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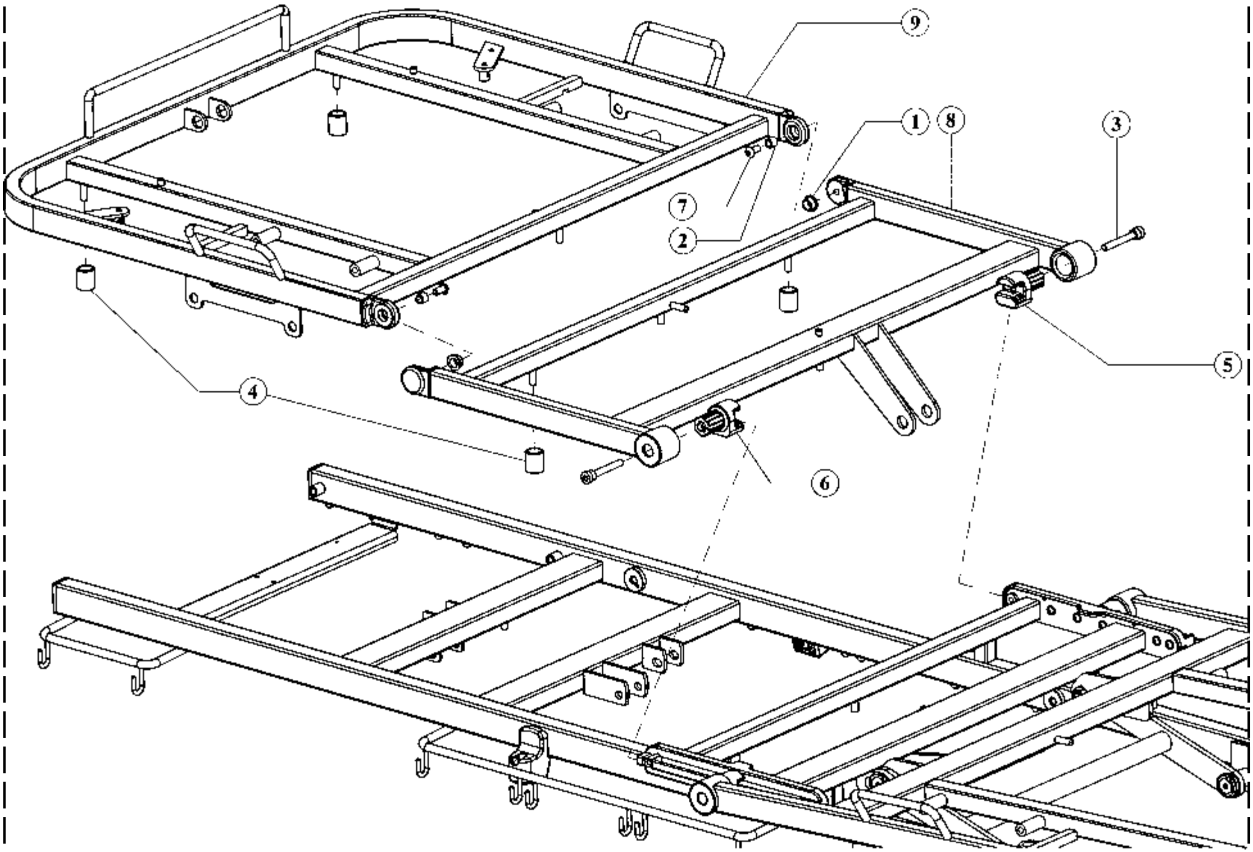

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5.15 Knee Section Motor and Bedframe Junction Box

No.	Qty	Reference	Description
1	2	QD0526	TRUARC CIRCLIPS 10 SPRINGFIX
2	2	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
3	2	S10822	MOTOR HEAD BUSH
4	1	S10555	KNEE SECTION MOTOR CLEVIS FASTENING PIN
5	1	S10667	TR/REV TR FOOT PIN MOTOR SPIGOT
6	1	VE0119	KNEE SECTION MOTOR
7	1	S30454	JUNCTION BOX
8	2	VI0464	BHC SCREW M5*16 Z.B.
9	2	VI0390	WASHER 5*12 Z.B.
10	1	QD1583	PRINTED CIRCUIT
11	1	LTZ208	BEDFRAME JUNCTION BOX CB09 CONENCTION cable

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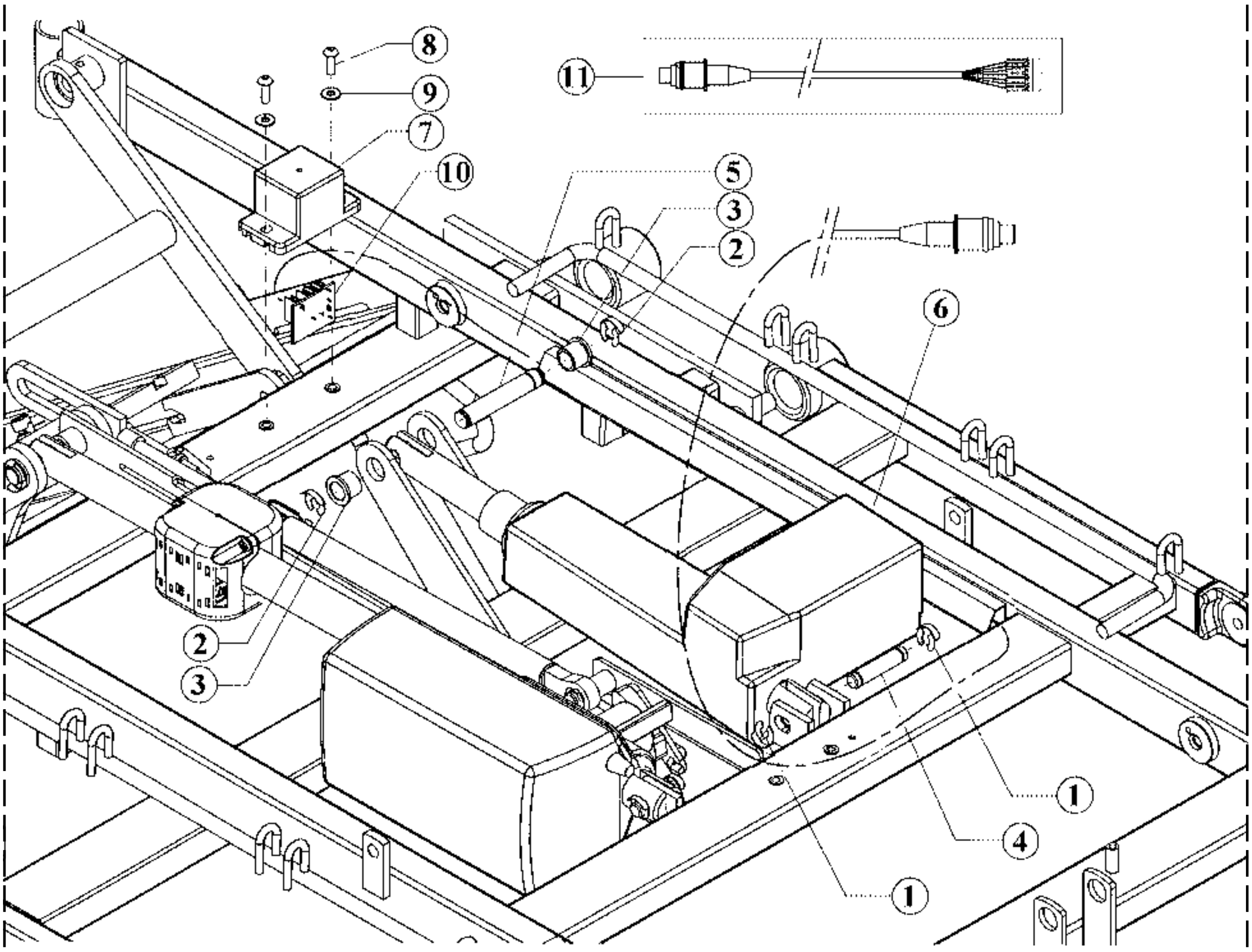
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5.16 Head Section Power and Assist

No.	Qty	Refrence	Description
1	1	QD0404	STRAP 186-210
2	2	QD0526	TRUARC CIRCLIPS 10 SPRINGFIX
3	3	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
4	1	S10452	LOW-VOLTAGE MOTOR PIN
5	2	S10822	SHOULDERED BUSH FOR PIN DIA.:12
6	1	S10736	BUSH 18*12.5*13
7	1	S10737	PIN DIA.:12 L=79 USEFUL LENGTH
8	1	LTZ209	HEAD SECTION MOTOR ASSEMBLY
9	1	VI0491	PLASTIC WASHER 12.2*24*1 NYLON
10	1	QD0055	SES STRAP 85/24 SL-M
11	1	VE0088	LIFT-O-MAT GAS SPRING F=450N
12	1	LT0475	GAS SPRING PLATE

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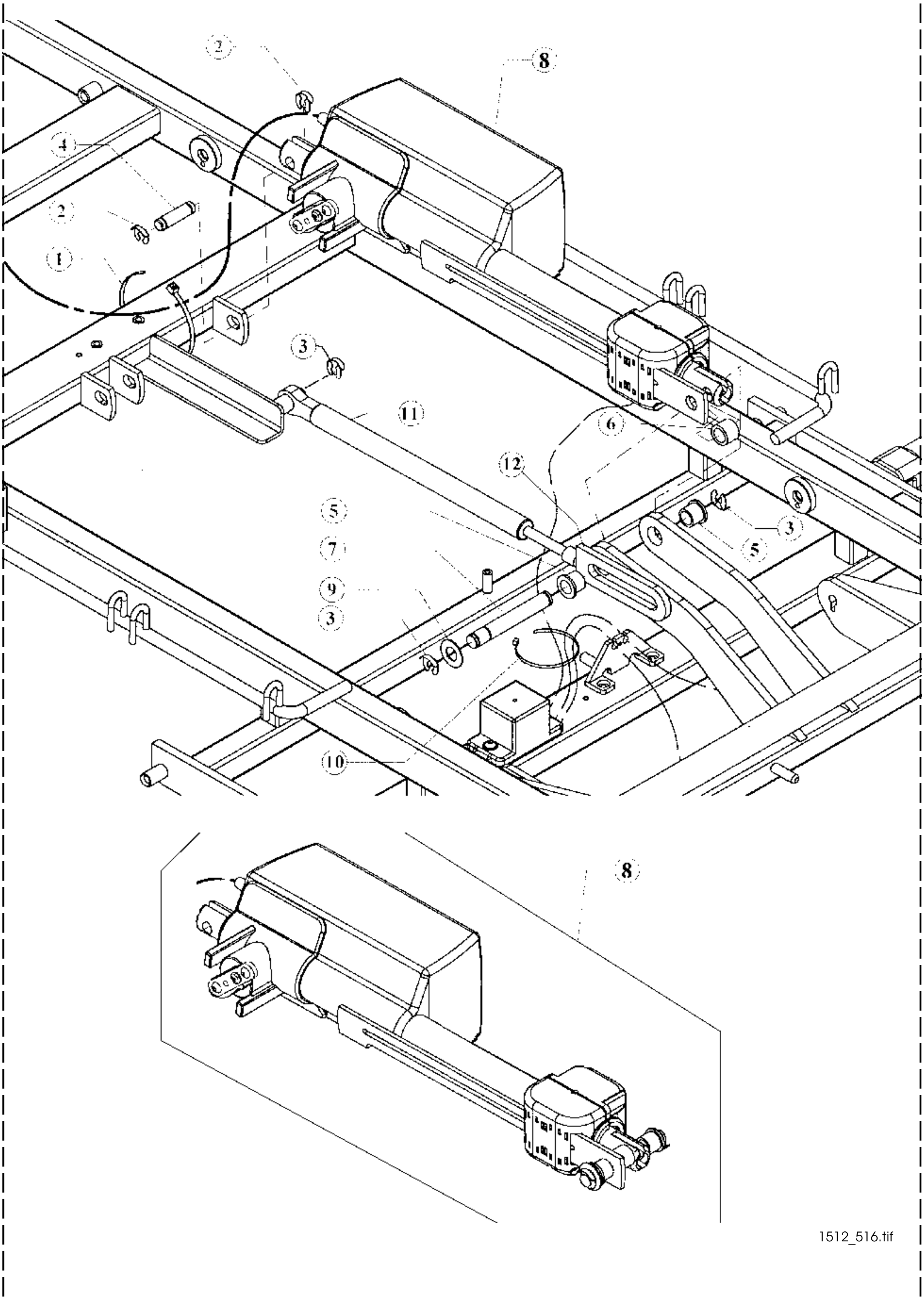
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5.17 CPR - Head Section Release

No.	Qty	Reference	Description
1	1	QD0808	SES STRAP 380/47 SL HT-C WHITE
2	1	QD0820	HEAD SECTION CABLE AND SLEEVING ASSEMBLY
3	1	QD0822	OPERATION CLEVIS "B" 5x20
4	1	S20677	HEAD SECTION BRACKET
5	1	S20678	DRAWBAR
6	2	VI0390	WASHER DIA.: 5x12 Z.B
7	2	VI0464	BHC SCREW DIA.: 5x16 Z.B

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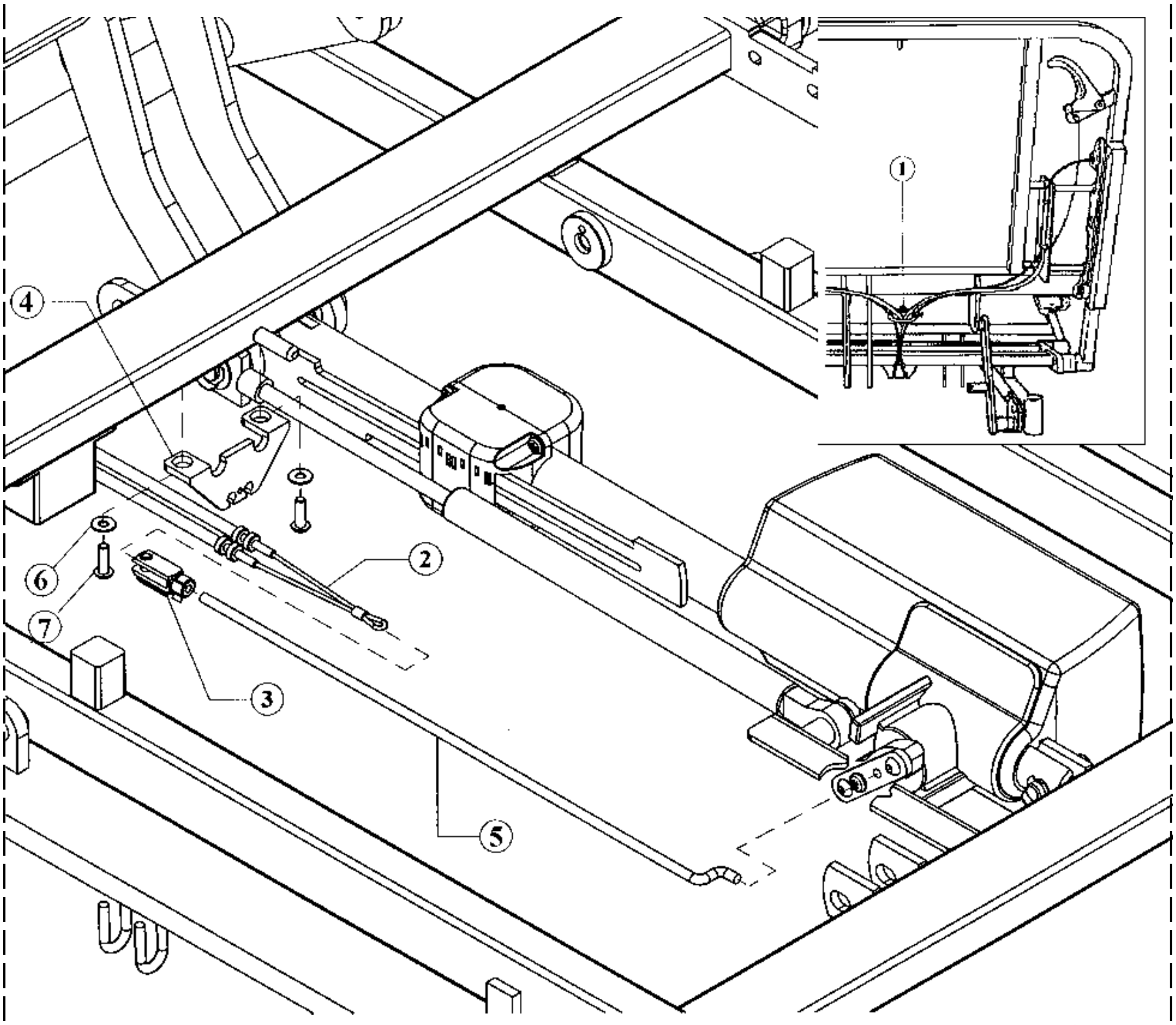

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5.18 Leg Section Mechanism

No.	Qty	Reference	Description
1	1	QD0055	SES STRAP 85/24 SL-M
2	1	QD0425	SPLIT PIN 8*25
3	4	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
4	1	QD0787	LEG SECTION CABLE & SLEEVING ASSEMBLY
5	1	QD0818	SPLIT PIN 4*34
6	2	S10822	MOTOR HEAD BUSH
7	2	S10822	MOTOR HEAD BUSH
8	2	S10667	TR/REV TR FOOT PIN MOTOR SPIGOT
9	1	S10715	LEG SECTION BUSH
10	1	S20634	TORSION SPRING
11	1	S20635	TRACTION SPRING
12	1	S20654	KNEE SECTION CATCH
13	1	S20711	LEG SECTION SLIDE BAR
14	1	S30373	LEG SECTION BASE
15	1	VI0419	BHC SCREW M6x16 Z.B
16	1	LTZ222 MB	LEG SECTION SLEEVE
17	1	F10510	SLEEVING STOP FLAT

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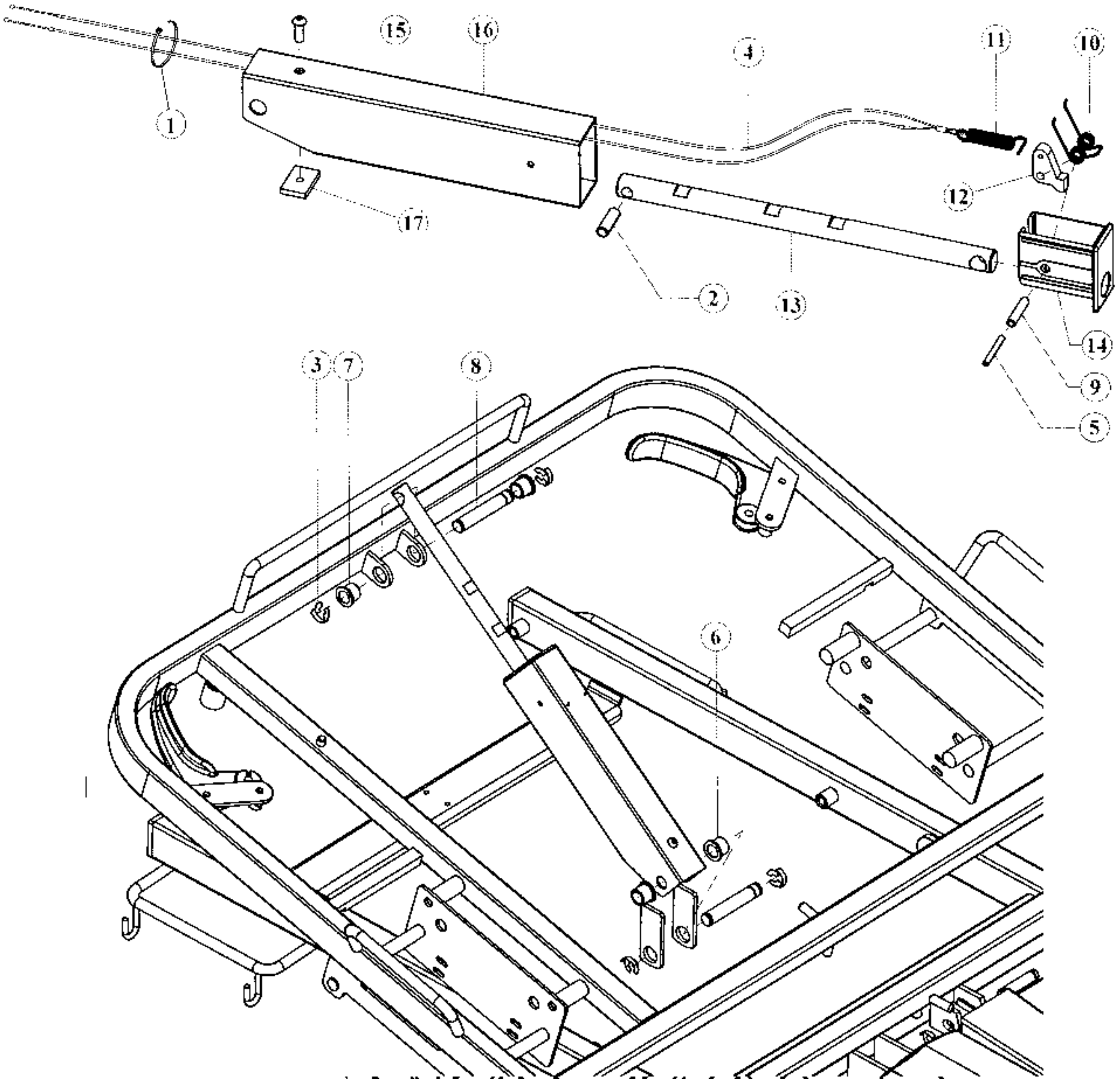
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5.19 Trendelenburg/Reverse Trendelenburg lever

No.	Qty	Reference	Description
1	1	P1Z191	PVC SLEEVING 52 SHORE D20x24 L=300
2	1	QD1111	FASTENING STRAP DIA.: 8
3	2	QD0409	NYLON SPACER 1025P2800
4	2	QD0527	TRUARC CIRCLIPS 12 SPRINGFIX
5	1	QD0578	PLASTIC LEVER DIA.9x15x+F134100 GR
6	1	S10448	BUSH DIA.:18 L=21 M6 (PA6)
7	2	S10501	KNEE SECTION ARTICULATION BUSH
8	1	S30331	TR/ REV TR FOOT WEDGE
9	1	VI0368	NYLSTOP LOCKNUT M10 S.B. Z.B
10	2	VI0372	CONTACT WASHER 8*18 Z.B
11	1	VI0374	WASHER 10x20 S.B. Z.B
12	2	VI0446	BHC SCREW M8x2 Z.B
13	2	VI0384	PLASTIC SCREW T45 CBL 4 x 12 ZB
14	1	VI0453	BHC SCREW M5x10 Z.B
15	1	LT0786 MB	TR/REV TR ASSIST LEVER
16	1	LT0757 MB	TR/REV TR RELEASE LEVER

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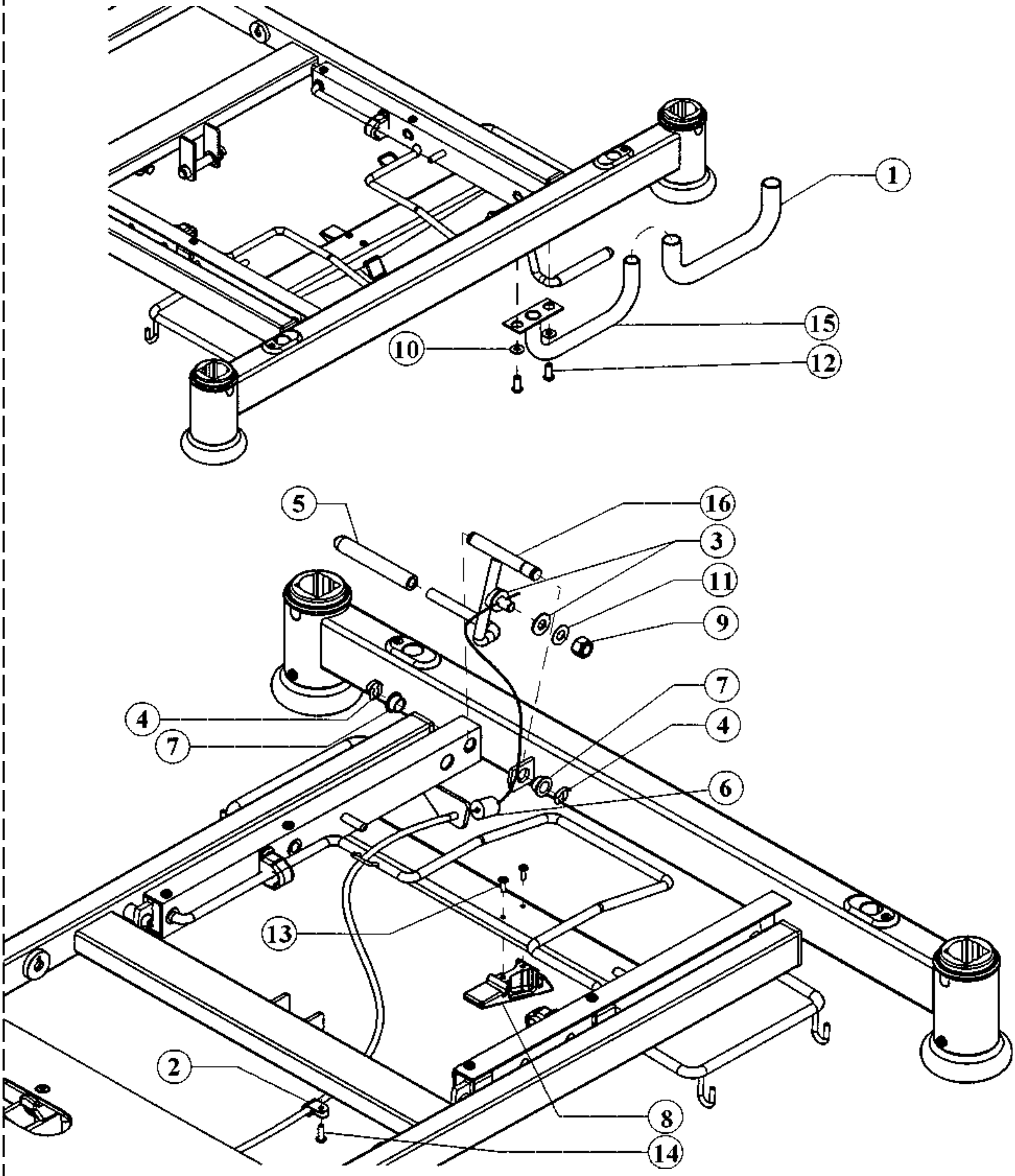
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5.20 Ends of the Bed

No.	Qty	Reference	Description
1	2	QD0663	STARLOCK PUSHNUT DIA.: 25
2	2	S30283	EVOLUTION ACCESSORY HOLDER
3	2	S30284	EUROLIT PROTECTIVE STOP
4	1	S30426	ROUND SOCKET
5	1	S30427	OVAL SOCKET
6	2	VI0402	PLASGOB SCREW 5x12 Z.B
7	2	VI0416	POZIDRIVE COUNTERSUNK HEAD SCREW NO.10x+F30913
8	2	QD1047	INSERT M8 PLUGGING COLLAR
9	4	QD0409	NYLON SPACER 1025P2800
10	2	S10802	ENDBOARD SUPPORT SCREW
11	1	S20726	LEFTHAND ENDBOARD SUPPORT
12	1	S20725	RIGHTHAND ENDBOARD SUPPORT
13	2	S30233	ELASTIC STOP

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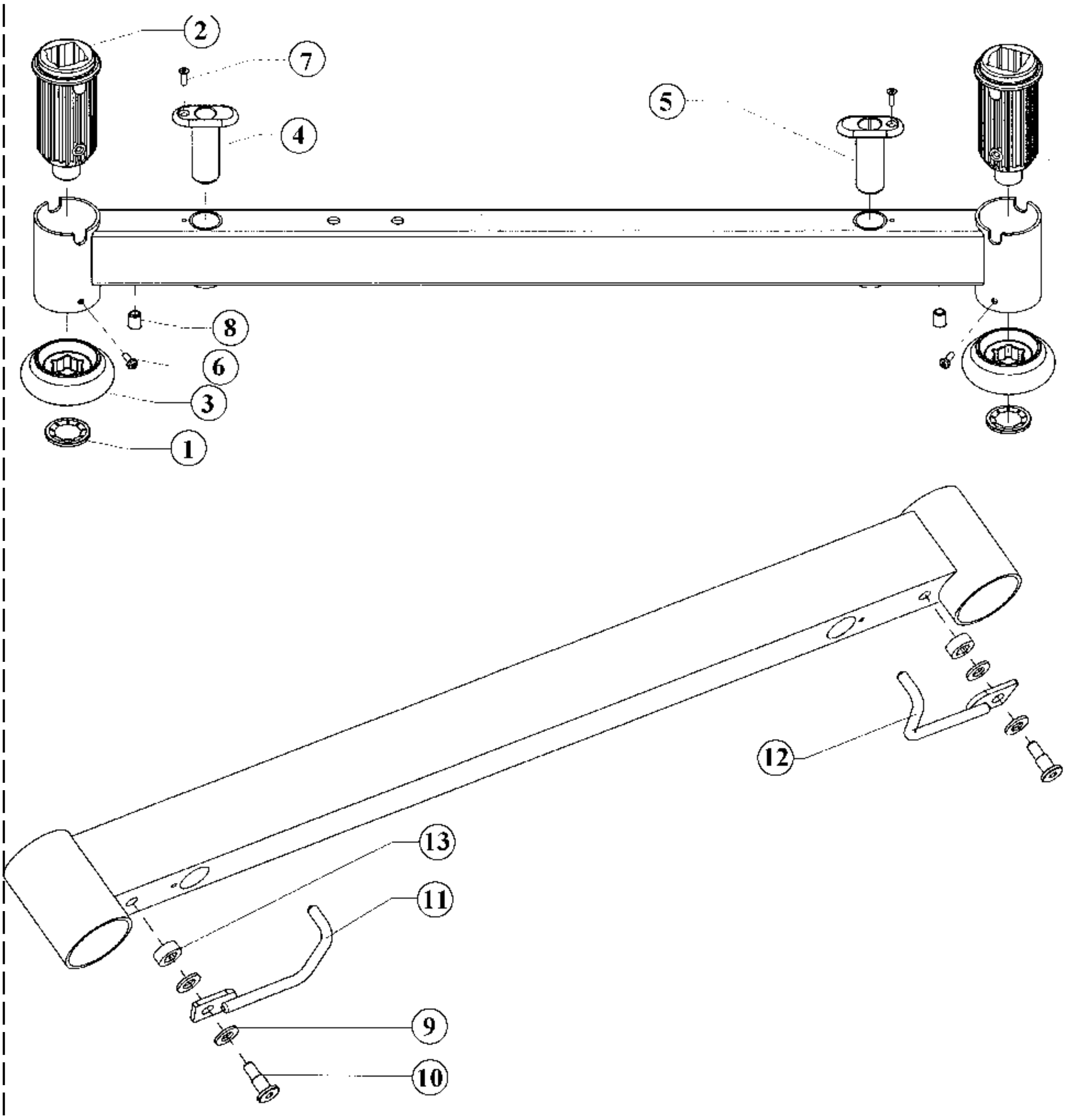
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5. 21 Fixed and Sliding Extensions

No.	Qty	Reference	Description
1	1	LTZ223 MB	EXTENSION
2	2	F10139	EXTENSION SLIDE BAR
5	4	S30315	EXTENSION PAD
FIXED EXTENSION			
3	2	S10808	FIXED-EXTENSION FASTENING BUSH
4	2	VI0019	H SCREW M8x35 Z.B
6	8	VI0402	PLASGOB SCREW 5x12 Z.B
7	2	VI0446	BHC SCREW M8x20 Z.B
SLIDING EXTENSION			
6	12	VI0402	PLASGOB SCREW 5x12 Z.B
7	4	VI0446	BHC SCREW M8x20 Z.B
8	1	S20560	EXTENSION LEVER
9	2	S30314	EXTENSION LEVER BEARING ASSEMBLY

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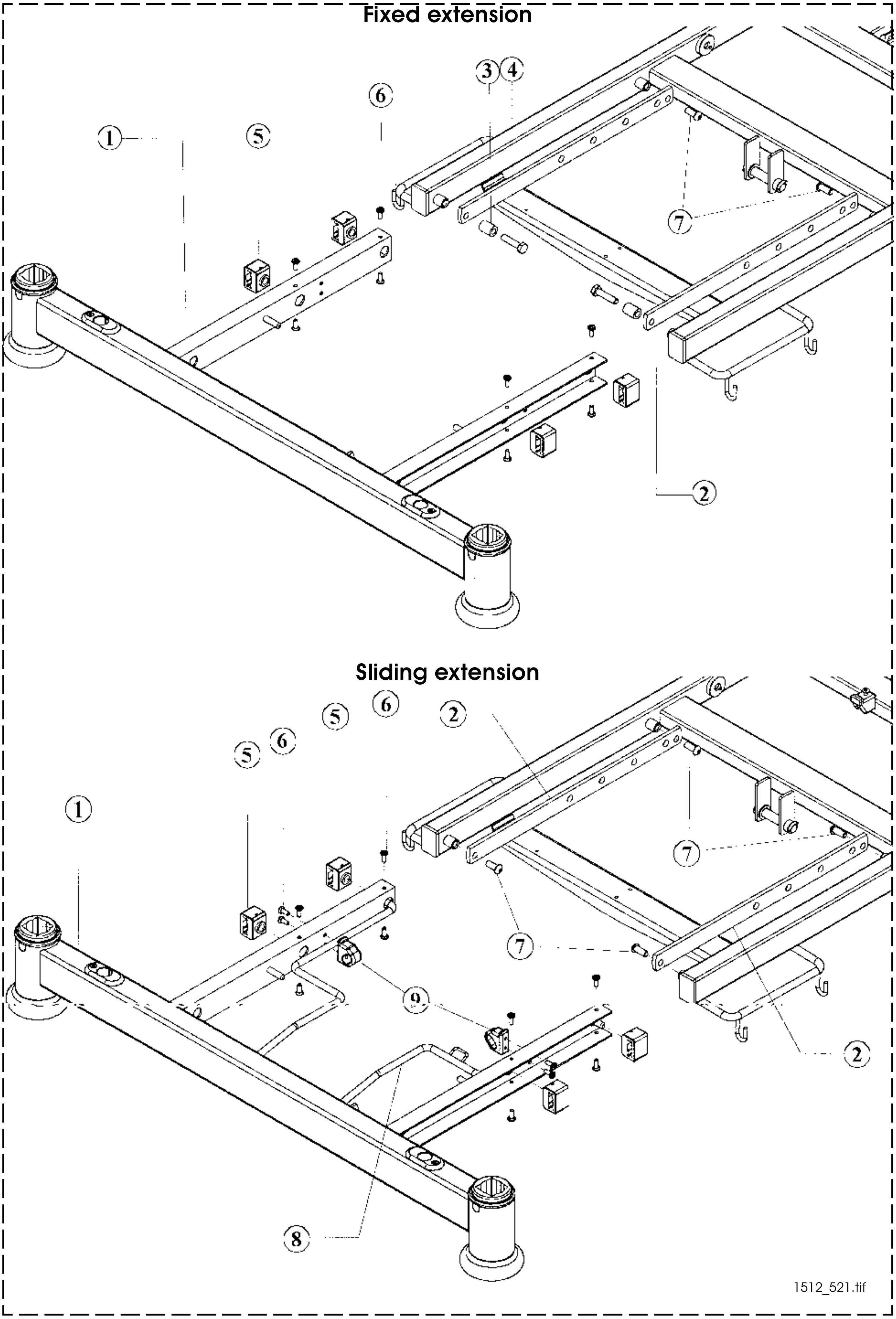

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Sliding extension

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5.22 Side-rail Fastenings

No.	Qty	Reference	Description
1	8	VI0327	HEX. SCREW M8x20 Z.B
2	8	VI0376	LOCKWASHER 8x14 Z.B
3	4	LT0800 MB	SIDE-RAIL SLIDE + PLATE
4	4	QD0808	SES STRAP 380/47
5	12	QD0637	SPACER DIA.12.8x DIA.18 L7.5

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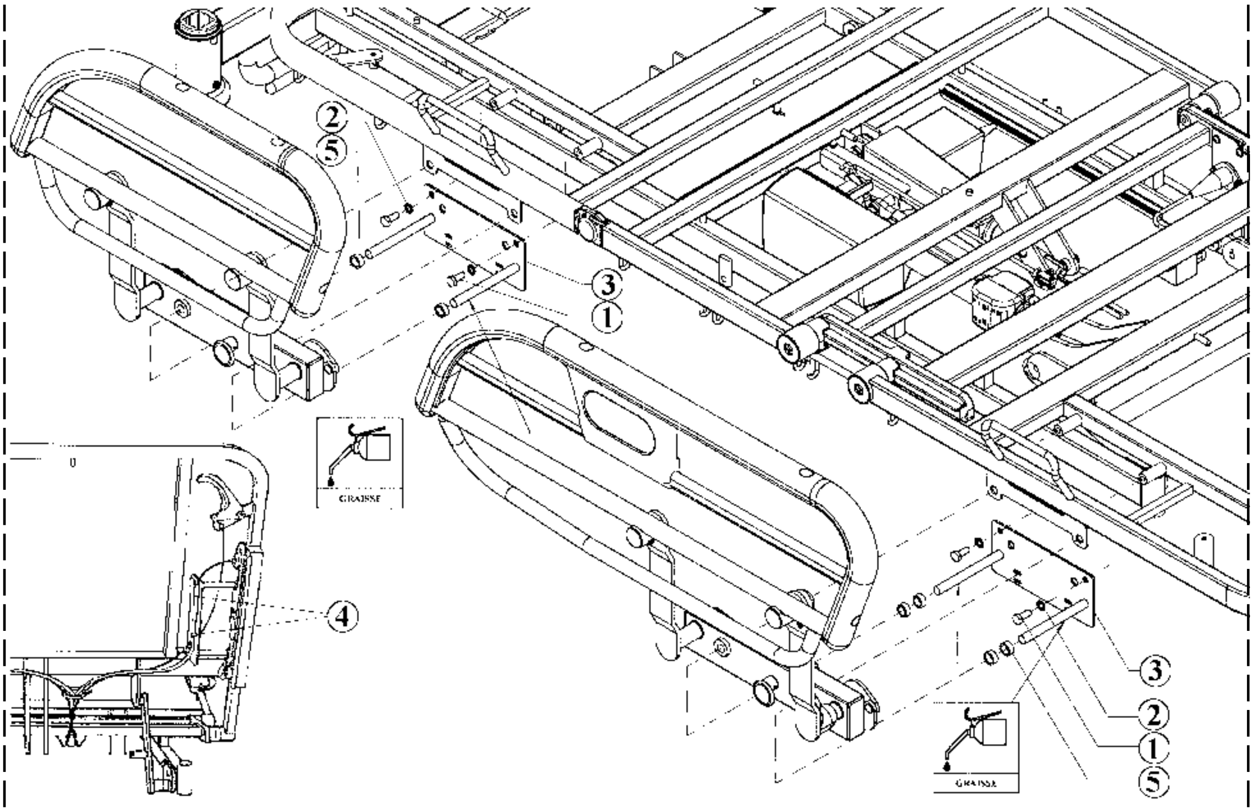
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5.23 Headend Side-rails up to 28/02/01

No.	Qty	Reference	Description
1	1	F1Z013	PLASTIC TUBE DIA.: 10x7 DARK BEIGE L=500mm
2	1	QD0583	SPLIT PIN 3.5x18
3	1	F1Z014	CABLE 7*0.14 L: 2250mm (see No. 29)
4	2	QD1317	7-PIN CONNECTOR HE14 (see No. 29)
5	2	F1Z009	ELASTOMER TAPE L: 60mm (see No. 29)
6	1	S20666	SIDE-RAIL SPRING
7	1	S20762	CATCH
8	4	S30271	PLUG
9	1	S30286	LOWER ARM COVER
10	1	S30287	HEAD ARM COVER
11	1	S30288	EUROLIT SIDE-RAIL BUTTON
12	2	S30369	SIDE-RAIL ENDSTOP
13	2	S30431	SIDE-RAIL UPPER ROTATION BUSH
14	2	VI0400	PLASGOB SCREW 4x15 Z.B
15	4	VI0464	BHC SCREW M5x16 Z.B
16	2	VI0470	TRIGOB SCREW CBL DIA.5x8 Z.B
17	5	VI0478	TRIGOB SCREW CB DIA.4x8 Z.B
18	4	S30319	SIDE-RAIL CONTROL PLUG
19	1	QD1188	CABLE FEEDTHROUGH INT. DIA. 12.5 EXT. DIA. 16
20	1	S20367	COMPRESSION SPRING DM11.3
21	1	BAZ032	RIGHTHAND HEADEND SIDE-RAIL LOWER SECTION
22	1	LTZ210	RIGHTHAND HEADEND SIDE-RAIL UPPER SECTION (without bar)
23	1	BAZ033	LEFTHAND HEADEND SIDE-RAIL LOWER SECTION
24	1	LTZ211	LEFTHAND HEADEND SIDE-RAIL UPPER SECTION (without bar)
25	1	LTZ212	HEAD SIDE-RAIL LONG BAR 156
26	1	LTZ213	HEAD SIDE-RAIL SHORT BAR 156
27	1	LTZ214	RIGHTHAND SIDE-RAIL CONTROL KIT 156
28	1	LTZ215	LEFTHAND SIDE-RAIL CONTROL KIT 156
29	1	LTZ216	SIDE-RAIL CABLE KIT
30	1	BAZ017	RIGHTHAND HEADEND FULL SIDE-RAIL 156D/E WITH CATCH
31	1	BAZ016	LEFTHAND HEADEND FULL SIDE-RAIL 156D/E WITH CATCH

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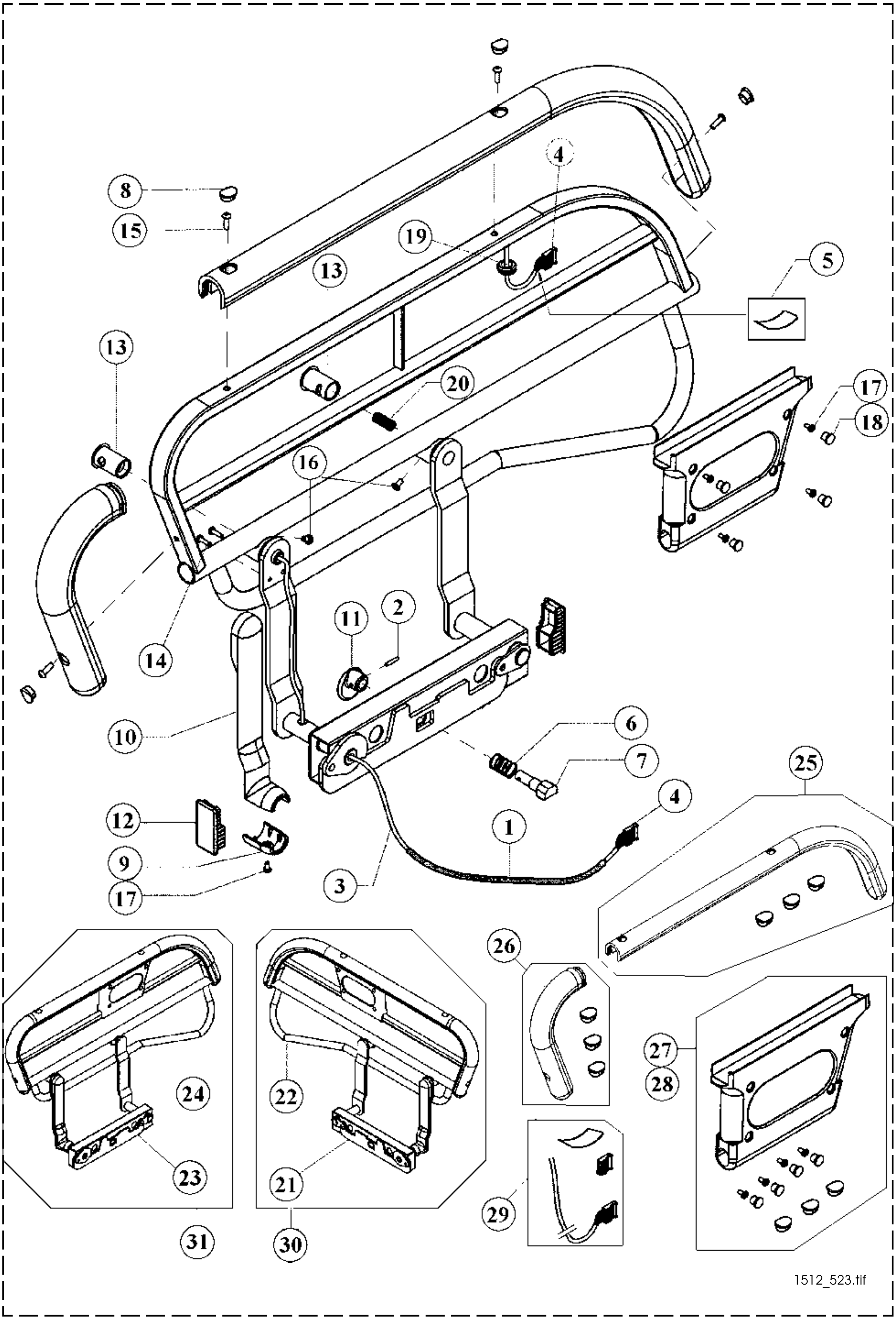
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5.24 Headend Side-rails after 28/02/01

No.	Qty	Reference	Description
1	1	See Page 5-48	PLASTIC TUBE DIA.: 10x7 DARK BEIGE L=500mm
2	1	See Page 5-48	SPLIT PIN 3.5x18
3	1	See Page 5-48	CABLE 7*0.14 L: 2250mm (see No. 29)
4	2	See Page 5-48	7-PIN CONNECTOR HE14 (see No. 29)
5	2	See Page 5-48	ELASTOMER TAPE L: 60mm (see No. 29)
6	1	See Page 5-48	SIDE-RAIL SPRING
7	1	See Page 5-48	CATCH
8	4	See Page 5-48	PLUG
9	1	See Page 5-48	LOWER ARM COVER
10	1	See Page 5-48	HEAD ARM COVER
11	1	See Page 5-48	EUROLIT SIDE-RAIL BUTTON
12	2	See Page 5-48	SIDE-RAIL ENDSTOP
14	2	See Page 5-48	PLASGOB SCREW 4x15 Z.B
15	4	See Page 5-48	BHC SCREW M5x16 Z.B
17	5	See Page 5-48	TRIGOB SCREW CB DIA.4x8 Z.B
18	4	See Page 5-48	SIDE-RAIL CONTROL PLUG
19	1	See Page 5-48	CABLE FEEDTHROUGH INT. DIA. 12.5 EXT. DIA. 16
25	1	See Page 5-48	HEAD SIDE-RAIL LONG BAR 156
26	1	See Page 5-48	HEAD SIDE-RAIL SHORT BAR 156
27	1	See Page 5-48	RIGHTHAND SIDE-RAIL CONTROL KIT 156
28	1	See Page 5-48	LEFTHAND SIDE-RAIL CONTROL KIT 156
29	1	See Page 5-48	SIDE-RAIL CABLE KIT
30	1	BAZ040	RIGHTHAND HEADEND FULL SIDE-RAIL 156D/E WITH CATCH
31	1	BAZ041	LEFTHAND HEADEND FULL SIDE-RAIL 156D/E WITH CATCH

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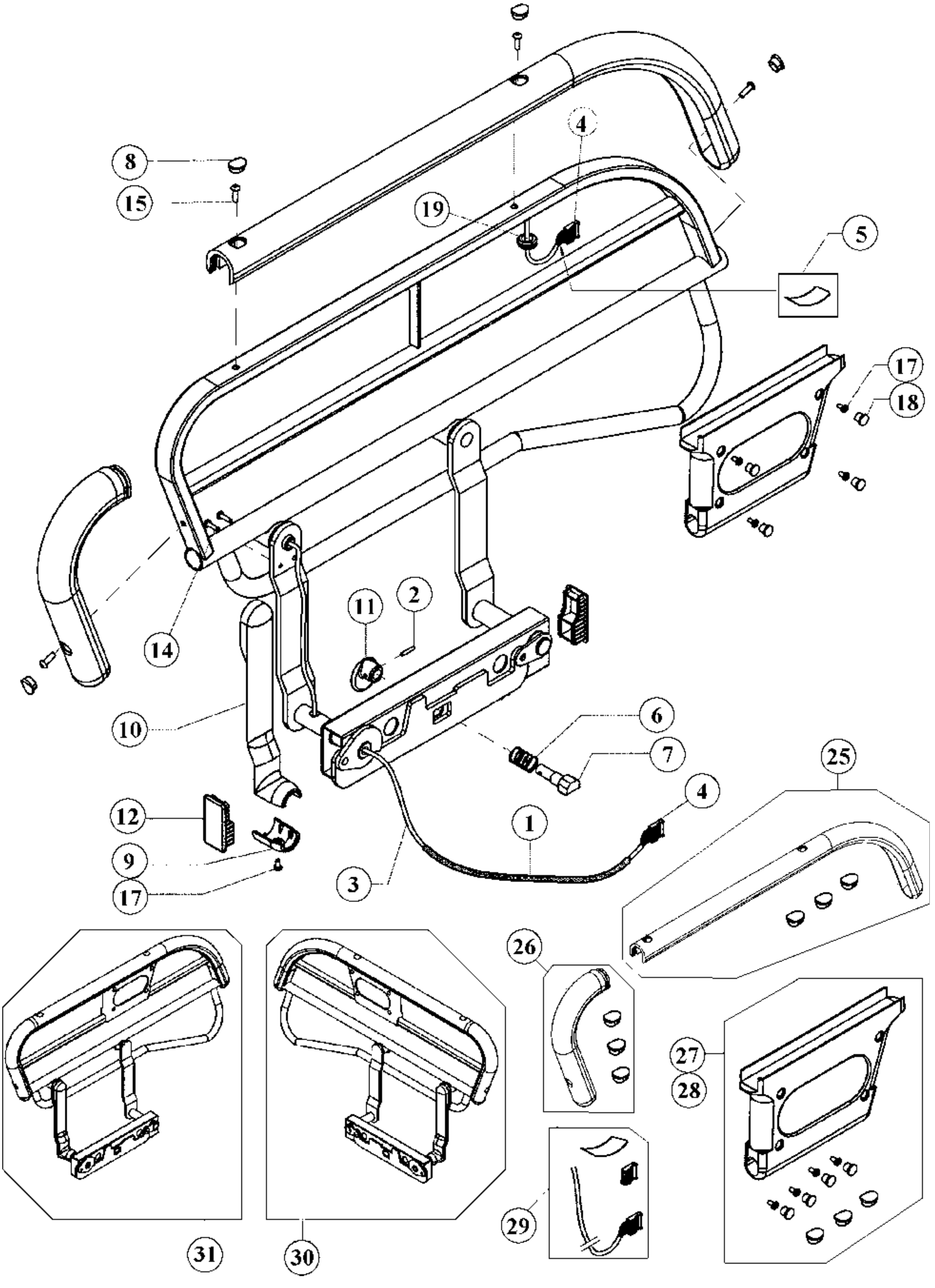
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5.25 Footend Side-rails up to 28/02/01

No.	Qty	Reference	Description
1	1	QD0583	SPLIT PIN 3.5x18
2	1	S20666	SIDE-RAIL SPRING
3	1	S20762	CATCH
4	4	S30271	PLUG
5	1	S30288	EUROLIT SIDE-RAIL BUTTON
6	2	S30369	SIDE-RAIL ENDSTOP
7	2	S30431	SIDE-RAIL UPPER ROTATION BUSH
8	4	VI0464	BHC SCREW M5x16 Z.B
9	2	VI0470	TRIGOB SCREW CBL D5x8 Z.B
10	1	S20367	COMPRESSION SPRING DM11.3
11	1	LTZ217	FOOTEND SIDE-RAIL LONG BAR KIT 156
12	1	LTZ218	SIDE-RAIL SHORT BAR KIT 156
13	1	LTZ219	FOOT SIDE-RAIL LOWER SECTION (without bar)
14	1	BAZ034	RIGHTHAND FOOTEND SIDE-RAIL LOWER SECTION
15	1	BAZ035	LEFTHAND FOOTEND SIDE-RAIL LOWER SECTION
16	1	BAZ019	RIGHTHAND FOOTEND FULL SIDE-RAIL 156D/E WITH CATCH
17	1	BAZ018	LEFTHAND FOOTEND FULL SIDE-RAIL 156D/E WITH CATCH

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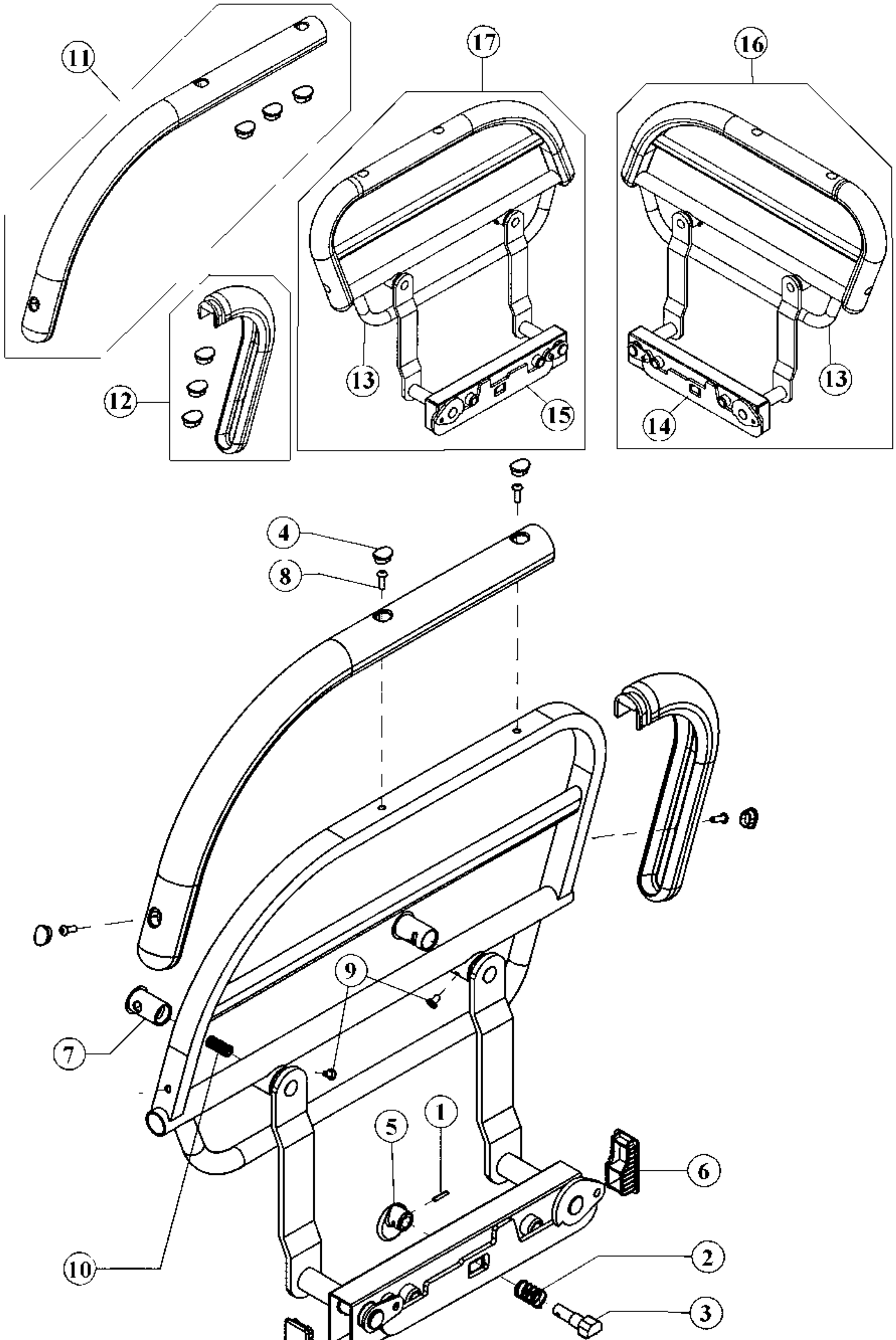
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5.26 Footend Side-rails after 28/02/01

No.	Qty	Reference	Description
1	1	See Page 5-52	SPLIT PIN 3.5x18
2	1	See Page 5-52	SIDE-RAIL SPRING
3	1	See Page 5-52	CATCH
4	4	See Page 5-52	PLUG
5	1	See Page 5-52	EUROLIT SIDE-RAIL BUTTON
6	2	See Page 5-52	SIDE-RAIL ENDSTOP
8	4	See Page 5-52	BHC SCREW M5x16 Z.B
11	1	See Page 5-52	FOOTEND SIDE-RAIL LONG BAR KIT 156
12	1	See Page 5-52	SIDE-RAIL SHORT BAR KIT 156
16	1	BAZ042	RIGHTHAND FOOTEND FULL SIDE-RAIL 156D/E WITH CATCH
17	1	BAZ043	LEFTHAND FOOTEND FULL SIDE-RAIL 156D/E WITH CATCH

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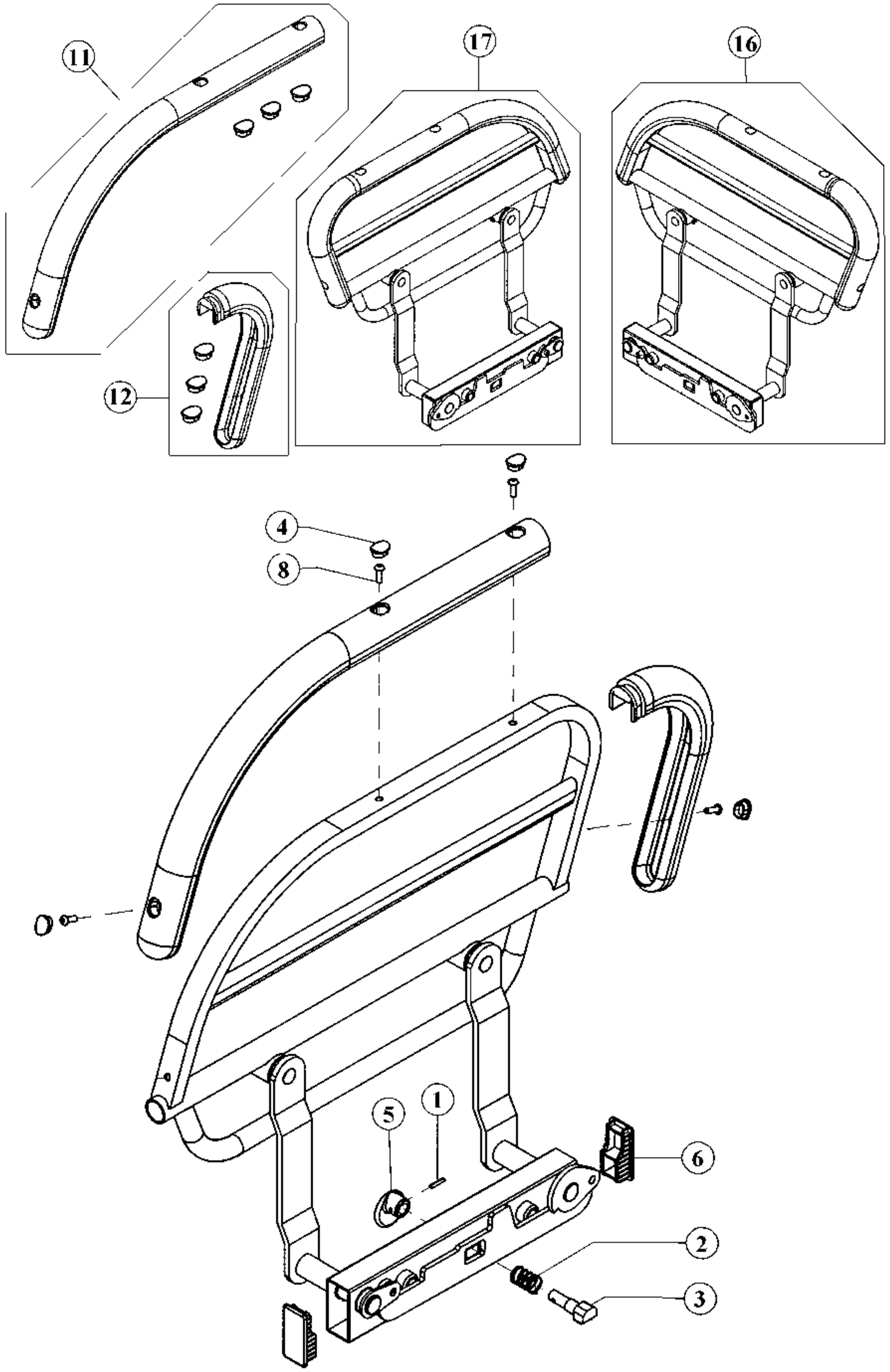
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5.27 Hand Pendant Control Unit Connection

No.	Qty	Reference	Description
1	1	S20866	PLATE
2	2	VI0550	POZIDRIV DOME-HEAD SCREW M3*12 Z.B.
3	2	VI0541	HEX. NUT M3 Z.B.
4	4	VI0542	WASHER 3*8 Z.B.
5	1	F11168	NYLON WIRE 100/10 L:280
6	2	S10638	LINEN HOLDER CABLE GLAND
7	1	QD0891	O-RING
8	1	S10880	PLUG
9	1	LTZ220	HAND PENDANT CONTROL UNIT CONNECTION CABLE KIT
10	1	QD1261	EVOLUTION CONTROL UNIT (AD091A)

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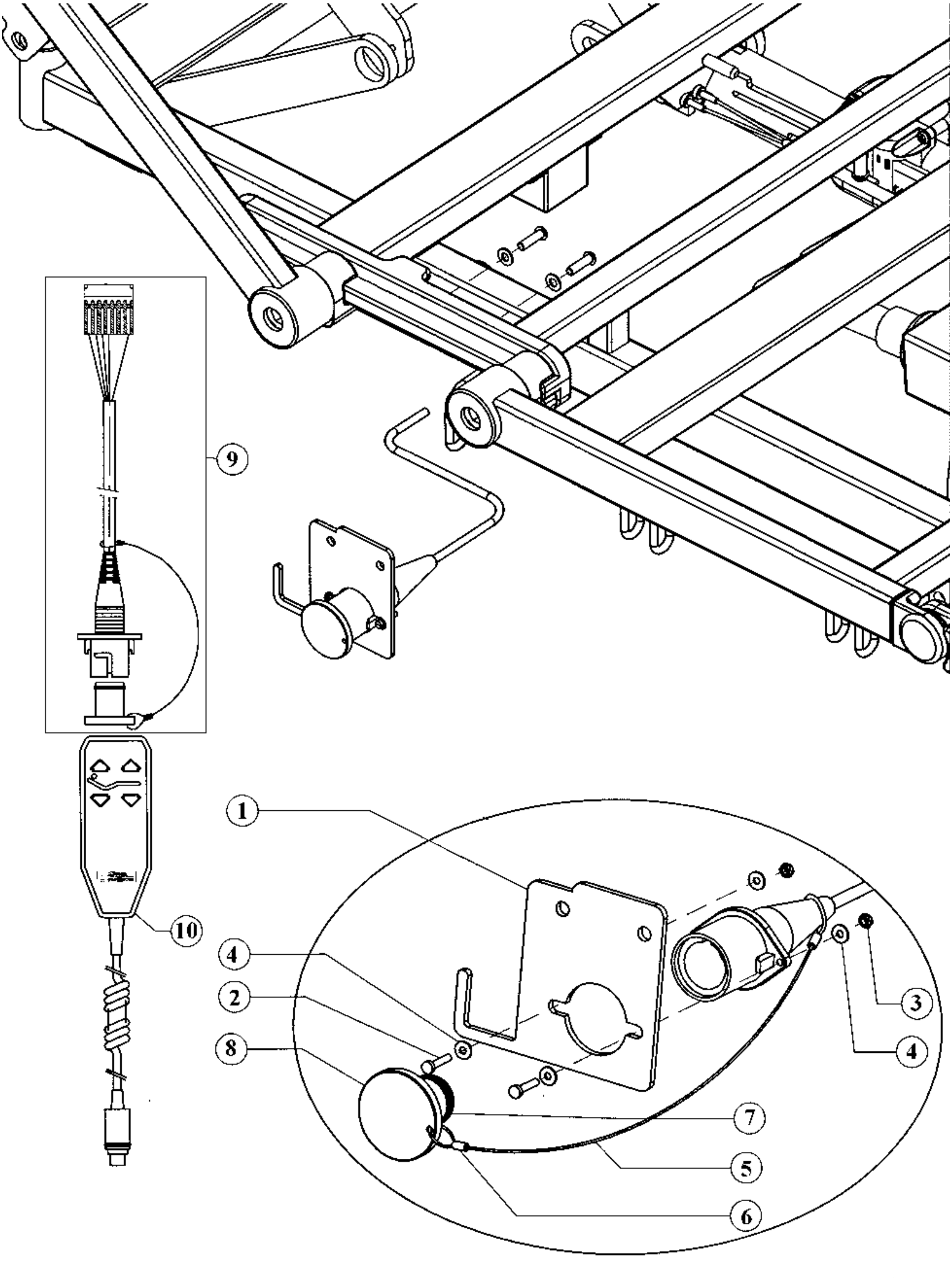
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5.28 Hard Surfaces

No.	Qty	Reference	Description
1	1	F10879	HEAD SECTION LAMINATED HARD SURFACE
2	6	S30281	LAMINATED HARD SURFACE FASTENING CLIP
3	6	VI0347	SCREW FHC/90 M6x12 Z.B
4	1	F10878	CENTRAL SECTION LAMINATED HARD SURFACE
5	1	F10880	KNEE SECTION LAMINATED HARD SURFACE
6	1	F10881	LEG SECTION LAMINATED HARD SURFACE

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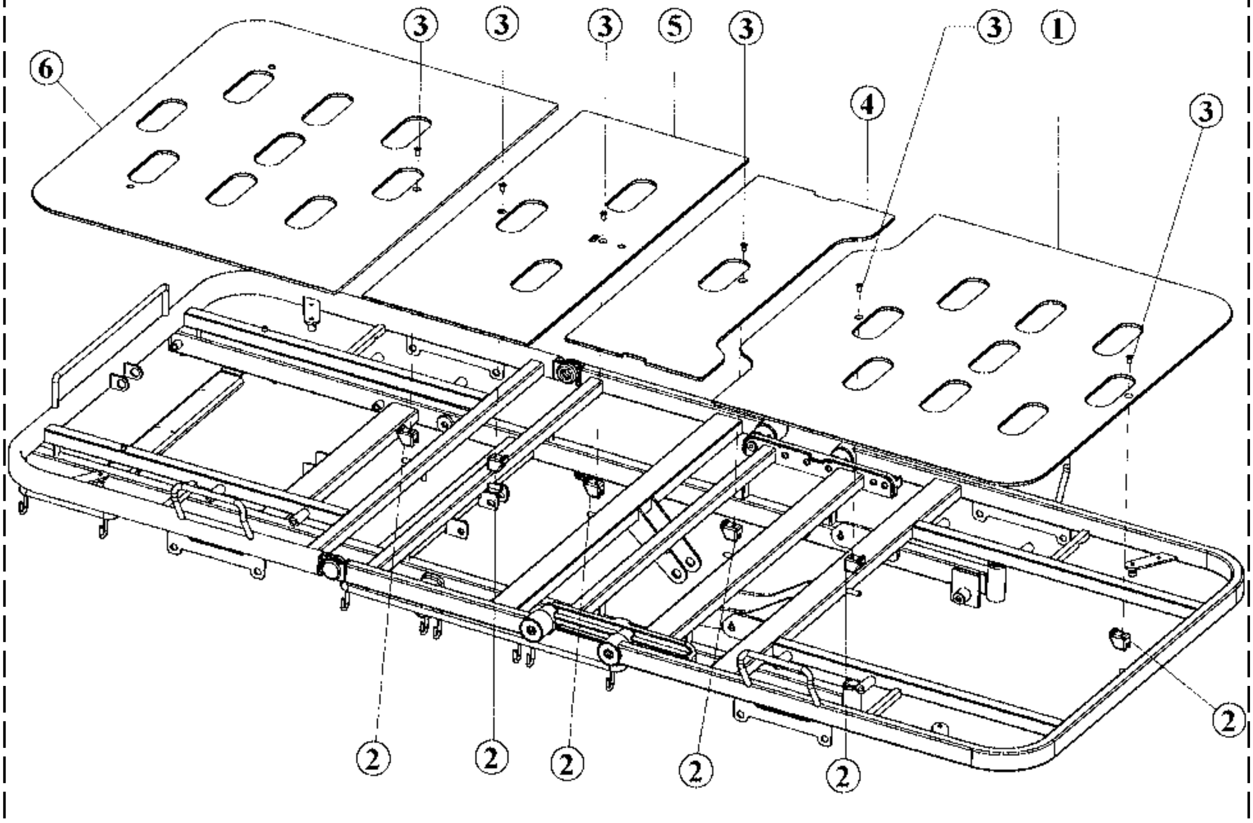
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5.29 Earthing

No.	Qty	Reference	Description
1	1	QD1175	EQUIPOTENTIAL LINK TERMINAL
2	1	QD0580	BUSH FR-POAG-S 4B1.071.01
3	1	QD0620	EARTH WIRE CHA-SOM HR3924010
4	3	QD0761	EQUIPOTENTIAL WIRE L=155
5	4	VI0241	SPRING WASHER D5 Z.B
6	4	VI0453	BHC SCREW M5*10 Z.B
7	6	VI0478	TRILOB SCREW CB D4*8 Z.B
8	2	QD0760	EQUIPOTENTIAL WIRE L=420
9	1	QD0404	STRAP 186 - 210

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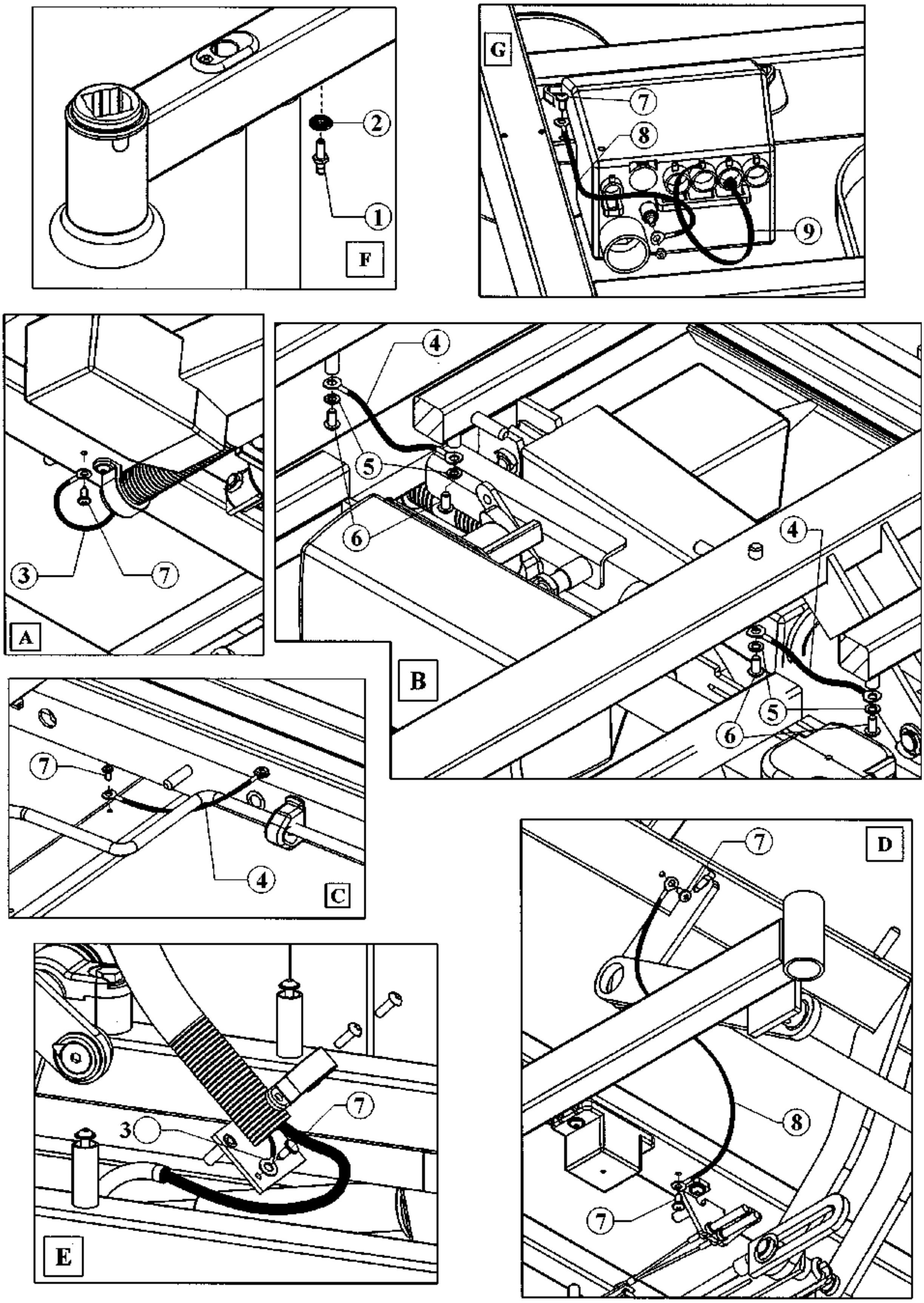
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5.30 Head and Footboards

No.	Qty	Reference	Description
1	1	DL135T	HEADBOARD OR FOOTBOARD OF THE BED
2	1	DL136P	LINEN HOLDER FOOTBOARD
3	2	LTZ050 +	LAMINATED ENDBOARD + DOUBLE-SIDE (INDICATE COLOUR CODE)
4	2	QD0701	LGC PIN D: 6*18 STAINLESS STEEL
5	2	LTZ863	ENDBOARD LOCKING MECHANISM

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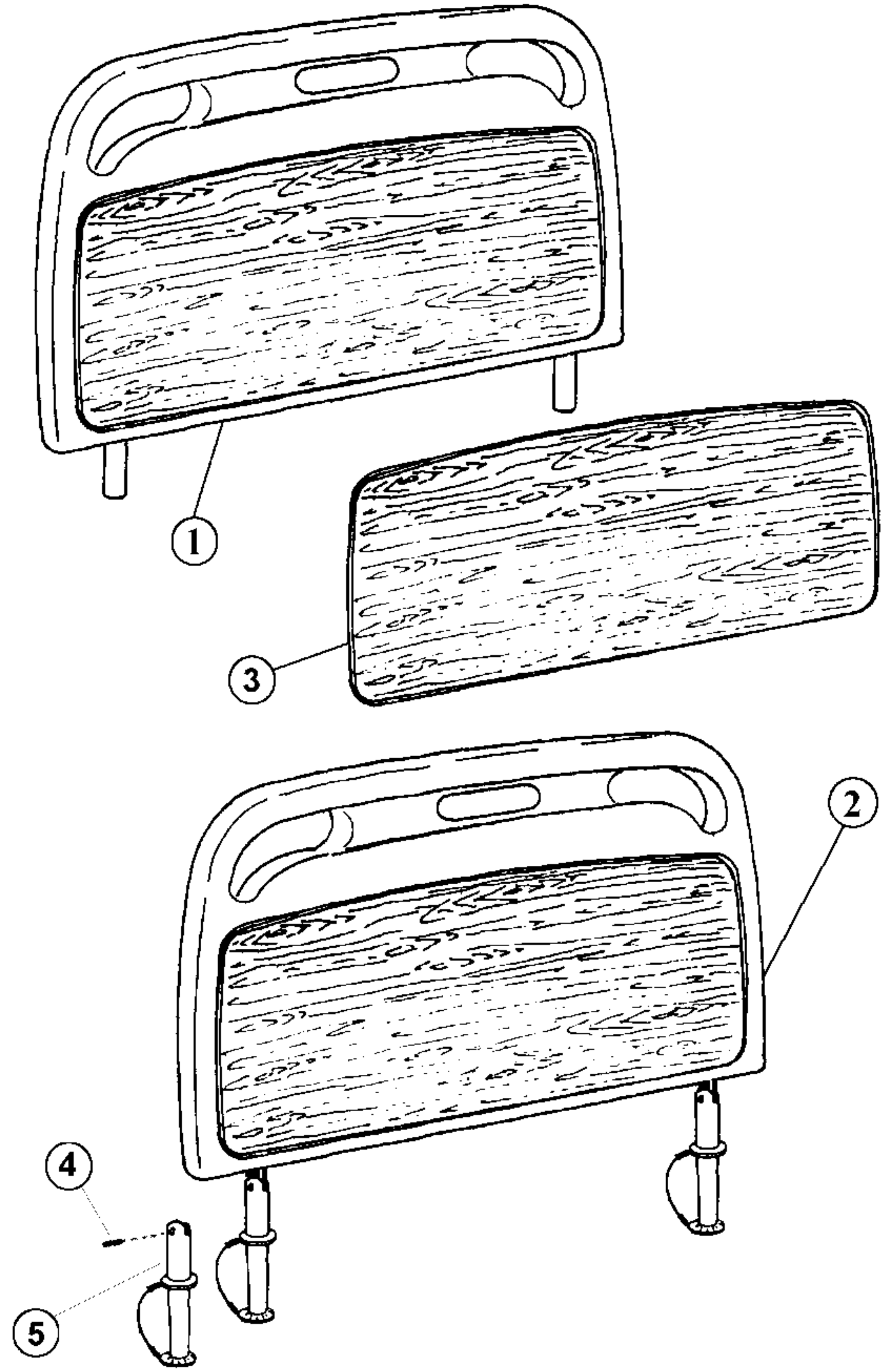

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5.31 Labels for Symmetrical Headboard 156Ex Bed

No.	Qty	Reference	Description
1	1	F10658	EARTH LABEL
2	1	F10749	EQUIPOTENTIAL LABEL
3	1	QD0821	CE LABEL
4	1	QD1090	LABEL PLATE FOR 156
5	1	QD1050	NF LABEL 156
6	1	QD1218	COMMERCIAL LABEL
7	1	Page 1-13	30 mA LABEL
8	1	Page 1-13	IDENTIFICATION LABEL
9	1	Page 1-13	BARCODE LABEL
10	1	Page 1-13	BATTERY LABEL
11	1	Page 1-13	ANTISTATIC CASTOR LABEL
12	1	Page 1-13	SIDE-RAIL LOCK-OUT LABEL

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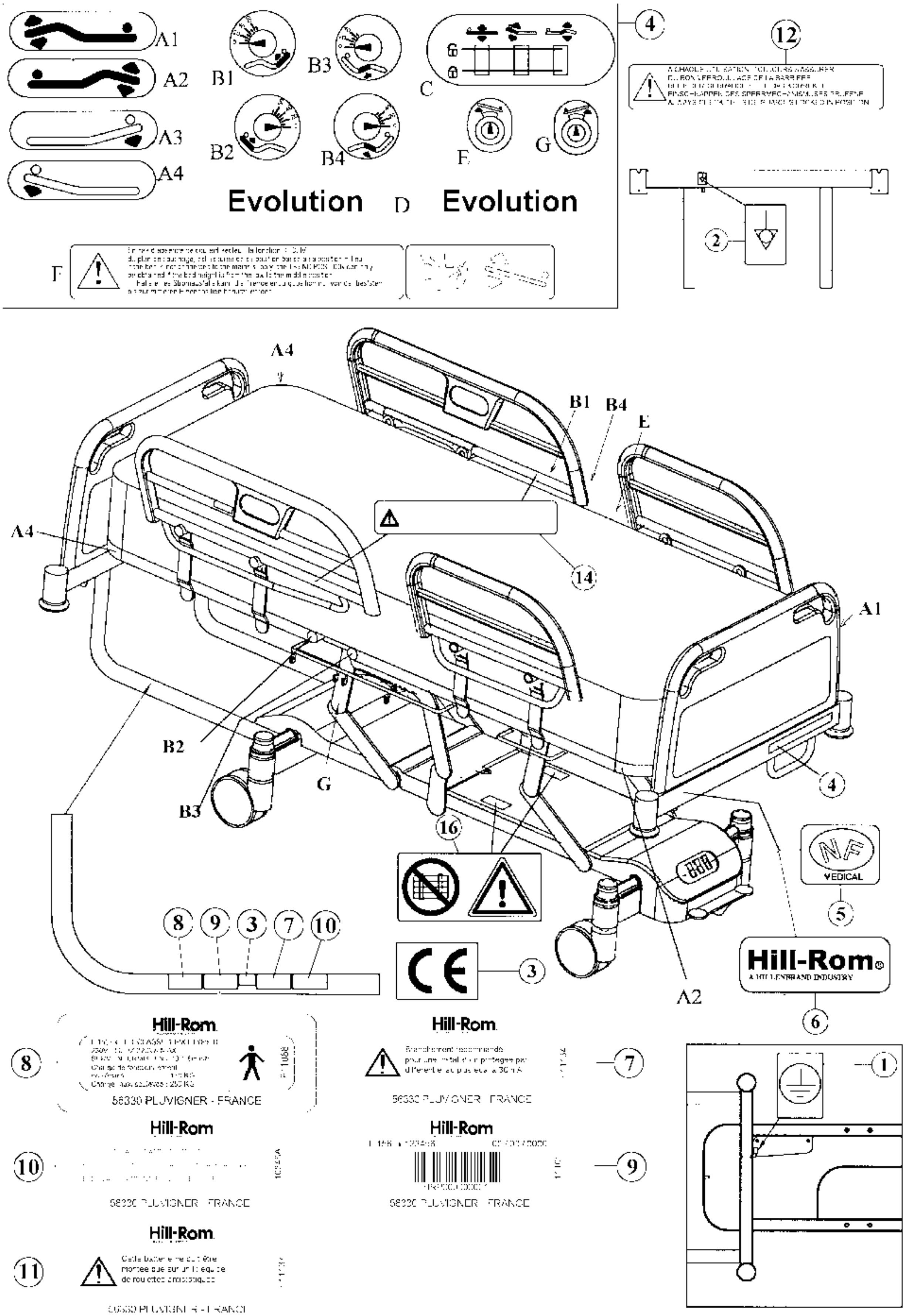
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5.32 Labels for Horizontal Symmetrical Headboard 156Ex Bed

No.	Qty	Reference	Description
1	1	Page 5-60	EARTH LABEL
2	1	Page 5-60	EQUIPOTENTIAL LABEL
3	1	Page 5-60	CE LABEL
4	1	QD1638	LABEL PLATE FOR 156
5	1	Page 5-60	NF LABEL 156
6	1	Page 5-60	COMMERCIAL LABEL
7	1	Page 1-13	30 mA LABEL
8	1	Page 1-13	IDENTIFICATION LABEL
9	1	Page 1-13	BARCODE LABEL
10	1	Page 1-13	BATTERY LABEL
11	1	Page 1-13	ANTISTATIC CASTOR LABEL
12	1	Page 1-13	SIDE-RAIL LOCK-OUT LABEL

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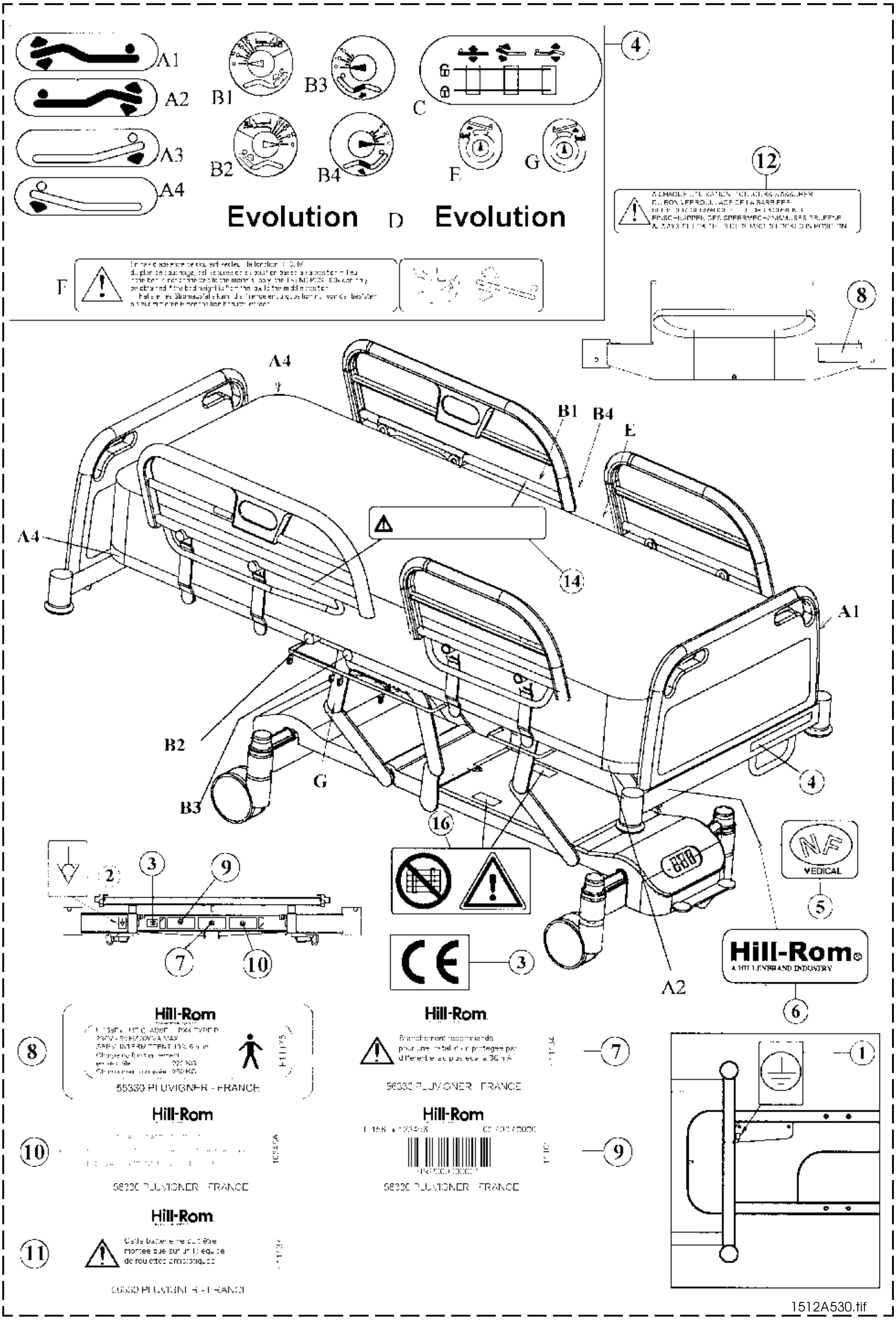
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Notes

6. General Procedures

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  General Cleaning 6- 2
  Steam Cleaning 6- 2
  Hard to Clean Spots 6- 2
  Disinfection 6- 2
Lubrication Requirements 6- 2
Storing the Bed 6- 2
Preventive Maintenance 6- 2
  Preventive Maintenance Schedule 6- 3
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Tools and Specific Requirements 6- 6

Cleaning and Care

WARNING

Unplug the bed before any cleaning or maintenance. Refer to the "Evolution Bed User Manual" and to the specific sections of this manual for other precautions.

General Cleaning

Clean the bed with a slightly dampened cloth and ordinary disinfectants. Do not subject any area to excessive amounts of liquid.

Steam Cleaning

Do not use any steam cleaning device on the Evolution bed. The excessive moisture can damage mechanisms and components in the bed.

Hard to Clean Spots

Use standard household cleaners and/or a soft bristle brush to remove troublesome spots or stains. Heavy dried on soil and excreta may first require soaking to loosen.

CAUTION

Do not use harsh cleaners, solvents or detergents.

Disinfection

Dilute disinfectants and/or germicides as specified on the manufacturer's label.

Lubrication Requirements

Certain parts of the Evolution bed must be greased at least once a year for optimum performance. Consult the preventive maintenance schedule.

Storing the Bed

For prolonged storage, the bed must be in the low position, covered, damp-proofed and at a temperature of between 0° and 40°C.

For a bed fitted with a battery: during storage, it is recommended to recharge the battery every three months.

After prolonged storage, it is also advisable to plug the bed into the mains supply for 12 hours to fully recharge the battery before using the bed.

Preventive Maintenance

WARNING

Only the authorised maintenance staff of the facility may carry out the specific maintenance procedures on the Evolution LI156Ex beds, and these procedures only. Otherwise, staff or operators may risk injury.

The Evolution bed should be subject to an efficient maintenance programme. This will ensure the long life and productivity of the Evolution bed and help to reduce downtime due to excessive wear failures.

An annual service of the bed is advised in order to maintain its characteristics and performance.

About once every three years, the electrical equipment should be inspected by an approved after-sales service technician, in order to obtain consistent equipment performances over time.

The life-time of the Variable Height and Knee Section motors, the power supply unit and the gas struts is 10 years, for average use. The life-time of the Head Section motor is 5 years because, in general, it is more intensively used than the other motors. The motors should be replaced beyond these periods.

The following preventive maintenance schedule is a reminder designed to guide the technician through a normal preventive maintenance procedure on the Evolution bed. Check each element of the schedule and carry out all the necessary adjustments during the preventive maintenance procedure.

The preventive maintenance programme is intended to be used in conjunction with the preventive maintenance checklist following it. This checklist is designed to keep a running history of maintenance and subsequent repair costs for the Evolution bed. Keeping close records and maintaining the Evolution bed are two good ways to reduce downtime and at the same time, keep the nursing staff happy and efficient.

Preventive Maintenance Schedule - LI156Ex

Function	Procedure
Global aspect, frame and welded assemblies	Check the overall aspect of the bed. Check that the frame and welded assemblies are in good condition and that there are no impacts or corrosion. Observe the symmetry of the bed and check that the bedframe and chassis are not bent or twisted. Carry out any necssary repairs and paint retouches. Check that all the labels are fitted, and, if damaged, replace them.
Head and footboards	Check the appearance, attachment and safety of the head and footboards. Replace if necessary.
Power supply cable	Check that there are no cuts, scrapes or breaks in the power supply cable or plug. Replace the cable if necessary.
Earth resistance	Check the condition of the cables and ground straps on the bed. Replace them if they are damaged or cut. Measure the resistance to earth between an exposed metal point (for instance, one of the side-rails or the head of a screw securing the side-rails to the articulated arms) and the earth terminal of the mains plug. Repeat the same test from the equipotential terminal. The value must be less than 0.2 ohms.
Variable Height (VH) motor	Inspect the motor assembly. Check its operation by taking the bed through a complete raise and lower cycle. Replace if there is any malfunction or abnormal noises.
Variable Height pedals: optional accessory:	Activate the two Raise and Lower controls of the bed by means of the pedals, and check the working of the corresponding operations. Replace or repair the pedals if necessary.
Hand Pendant control unit: accessory	Press each control on the control unit and check that the corresponding function is activated. Replace if necessary.
Head Section (HS) motor	Inspect the motor assembly and EOT unit guide. Check that the EOT unit is aligned and blocked on the motor. Check its operation by taking the relevant section through a complete raise and lower cycle. Replace if there is any malfunction or abnormal noises. **Note:** HS Raise: when the high position is reached, release the HS Raise button then press this control again. **Note:** HS Lower: when the low position is reached, release the HS Lower button then press this control again. In both cases, replace the motor if any untoward movement is noticed.
Knee Section (KS) motor	Inspect the motor assembly. Check its operation by taking the relevant section through a complete raise and lower cycle. Replace if there is any malfunction or abnormal noises.
Autocontour	Check that the KS Section rises to an angle of 16° when the "HS Raise" control is activated and that it lowers automaticaly when the "KS Lower" control is activated and that the HS reaches an angle of 22°. Replace the defective motor if necessary.
Lockout switches	Test the switches separately in order to check that they operate correctly. Replace if necessary.

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Table 6-1. Preventive Maintenance Schedule

Function	Procedure
Side-rail controls	Test the buttons of the two side-rails in order to check that they activate the right function. Make sure that they do not function intermittently. Replace if necessary.
Side-rail frame	Check that the side-rails are not bent or twisted. Inspect the assembly. Replace any damaged or missing parts. Test the locking in high position or mid-height by pulling them up. Check that they slide smoothly into the bedframe when it is in low position. Lubricate the guide rods withgrease.
CPR release	Test the CPR release on each side of the bed and ensure that the system locks correctly. The Head Section should rise as soon as the lever is released if the corresponding control is pressed. Replace the drive cable or the motor if necessary.
Mechanical foot section	Put the Knee Section to the high position using the corresponding control, then test the operation of the bed's foot section. Do this by raising the section and making sure that the mechanism locks correctly in each position. Check the locking with both levers located on the righthand and lefthand sides of the bed. Repair if necessary.
Extension (optional)	Activate the extension in order to verify that its movement is correct and that it locks properly into the different positions when the lever is released. Lubricate the guide rails withgrease. Replace any defective or missing parts.
Articulated joints	Check that the articulations of the bed operate without making any noise. Replace the self-lubricating bushes if necessary. Note: If one of the bushes is worn, it is advisable to replace them all.
Trendelenburg/ Reverse Trendelenburg	Inspect the Trendelenburg/Reverse Trendelenburg mechanism: Trendelenburg: put the bed into Trendelenburg position then return it to the horizontal position. Reverse Trendelenburg: activate Reverse Trendelenburg from the high position of the bed and check that the bedframe lowers automatically to the required postion. Return the bed to the horizontal position. These operations should function without forcing or any abnormal noises. In the Trendelenburg position, activate the bed Lower function and check that the bedframe stops in the low position when the Trendelenburg EOT is activated. Repair if necessary.
Castors	Check for cuts, wear and quality of the tread, etc. Replace if necessary.
Braking and steering	Check the brakes to see whether the bed moves when the brake pedal is pressed. Adjust if necessary. Check the steering mechanism. Replace or adjust the steering control elements of the steering castor if necessary. Replace the castor if necessary.
Bedside Cabinet Transport	Bedside Cabinet Transport Rails: Check that there are no cuts deep scratches or breaks on the plastic rails. Replace the rails if necessary. Check the attachment of the rails on the SH frame. Replace any defective or missing screws.
Administrative procedures	Carry out all the necessary administrative procedures.

1512Atbl_601

Table 6-1. Preventive Maintenance Schedule (continued)

Preventive Maintenance Checklist

Manufacturer: Hill-Rom																						Global aspect, frame and welded assemblies
																						Head and footboards
																						Power supply cable
																						Earth resistance
																						Variable Height pedal
																						Head Section motor
																						Knee Section motor
Model Number:																						Autocontour
																						Lock-out switches
																						Side-rail controls
																						Hand-held control unit
																						Side-rail structure
																						CPR release
																						Mechanical foot section
																						Extension
Serial Number:																						Articulated joints
																						Trendelenburg/ Reverse Trendelenburg
																						Castors
																						Braking and steering
																						Administrative procedures
Total Cost For This Page:																						Labour:
																						Repair cost:
																						Inspected by:
																						Legend L=Lubrication C=Cleaning A=Adjustment R=Repair or Replacement O=Okay N=Not okay Applicable Remarks

1512_600.wmf

Tools and Specific Requirements

The Evolution bed requires no special tools or requirements, apart from a torque wrench and pliers that are used to assemble the side-rail cables (ref: OUZ001).

Notes

7. Accessories

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- 7.2.5 Two-slot bottle holder: AC908A 7- 3
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7.1 Summary list

Details also available on the compatibility of all the accessories of the Evolution range:

Key: Y = yes, N = No, Int. = integral

Reference	Description	LI156Ex
AC903A	Traction frame support	Y except SHS bed
AC907A	Raised drainage bag holder	Y
AC908A	Two-slot bottle holder	Y
AC910A	Chrome-plated patient helper	N
AC915A	Headboard tray	N
AC920A	I.V. pole	N
AC923A	Label holder	Y
AC930A	1 chrome-plated copper nickel frame	Y
AC931A	Side tray on stainless steel bedframe	N
AC932A	1-litre stainless steel bottle holder	Y
AC938A	2-litre stainless steel bottle holder	Y
AC939A	6-hook stainless steel bag holder	Int.
AC940A	2-hook stainless steel bag holder	Int.
AC953A	Adaptable I.V. hook on patient helper	Y
AC959A	Pivoting oxygen cylinder holder	Y
AC961A	3-litre stainless steel bottle holder	Y
AC962A	3-litre pivoting stainless steel bottle holder	Y
AC963A	Syringe-driver holder	Y
AC967A	Monitor platform	Y
AC968A	Equipotential cable	Y
AC991A	Stainless steel triangular section bottle holder	Y
AC992A	Mattress for bedrame extension panel	Y
AD011A	Side tray on stainless steel base	N
AD016A	Drainage bag holder	Y
AD051A	Headboard storage feature	Int.
AD080A	Chrome-plated patient helper	Y
AD081A	Adjustable patient helper	Y
AD082A	I.V. pole: new model	Y
AD083A	Head Section tray	Y except SHS bed
AD086A	Side-rail accessory	N
AD098A	Electrical Variable Height pedal kit	Y
AD090A	Hand pendant control unit assembly kit	Y
AD091A	Hand pendant control unit	Y
ST856A	Kinétec Head Section frame - crossbeam PR03 -	Y
ST860A	Kinétec frame	Y

1512Atbl_700

7.2 Accessory details for the LI156Ex Bed

WARNING

Consult the Evolution bed user manual before using accessories in order to prevent any injury to the patient or the user.

7.2.1 Adaptable I.V. hook on patient helper: AC953A

This hook screws onto the upper part of the patient helper by means of a knob.

7.2.2 Mattress for bedframe extension with panel: AC992A

This mattress, with its support panel, goes under the feet of the patient when the bed extension function is used. The panel is attached when the extension is completely out, by means of a system of clips and catches. In order to attach it, place the clips level with the catches and push hard.

7.2.3 Headboard tray: AD083A

This tray is placed on the chassis of the bed under the Head Section. It cannot be fitted to an SHS bed chassis.

7.2.4 Stainless steel 3-position, 1, 2 and 3 litre bottle holder: AC932A, AC938A and AC961A

These bottle holders are placed on either side of the middle section of the bed by means of plastic supports on the bedframe.

7.2.5 Two-slot bottle holder: AC908A

This bottle holder is placed on either side of the middle section of the bed by means of plastic supports on the bedframe.

7.2.6 3-litre pivoting bottle holder: AC962A

This bottle holder is placed on either side at the bed's footend by means of slots at the end of the bed.

7.2.7 Label holder: AC923A

The label holder identifies the patient on the bed. It is positioned by clipping it onto the upper rounded part of the footboard.

7.2.8 Monitor stand: AC967A

This support for monitoring equipment fits into existing slots at the foot of the bedframe and the tray can be postioned for use or stowed away.

7.2.9 Syringe-driver holder: AC963A

This support fits into existing slots on the right or left of the bedframe at the headend. Its height as well as its position can be adjusted by means of a knob which can be tightened or loosened while holding the tray.

WARNING

Hold the tray before loosening the lock knob. If it is not held, the tray may fall suddenly and cause injury.

7.2.10 Drainage bag holder, triangular section drainage bag holder and raised drainage bag holder: AD016A, AC991A and AC907A

These drainage bag holders are placed on either side of the bed by means of plastic supports on the bedframe.

7.2.11 Chrome-plated patient helper: AD080A

The AD080A patient helper fits into the existing slot in the bedframe at the head of the bed, **to the left or to the right of the patient**.

7.2.12 Adjustable chrome-plated patient helper: AD081A

The patient helper fits into the existing slots in the bedframe at the head of the bed to the left or right of the patient.

7.2.13 Pivoting oxygen cylinder holder: AC959A

The cylinder holder is placed at the right or the left and mainly at the bed's headend in the slots provided at the ends of the bedframe.

7.2.14 I.V. poles: AD082A

The AD082A I.V. pole fits into the existing slots in the bedframe at the head of the bed, on both sides of the patient. The height can easily be adjusted by pressing down on the unlocking button situated three-quarters of the way up, while holding on to the pole.

7.2.15 Chrome-plated frame: AC930A

The chrome frame allows the bed to be moved and a traction frame to be installed. It is positioned at the headend or footend in the slots at the ends of the bedframe. To do this, the two black knobs that hold the frame must be loosened, and tightened again when the frame is in place.

7.2.16 Equipotential cable: AC968A

This is designed to connect medical equipment with intravascular or intracardiac links to the bed. It has two connectors (type POAG-WB 6 DIN) and a 2-metre yellow/green wire.

7.2.17 Kinétec frame: ST860A assembled with: ST856A, AC930A, AC903A (SH bed only)

A Kinetec traction frame can be used with the Evolution bed.

Assembly on SH bed: it is attached with the following elements:

- Kinetec head section frame - PR03 crossbeam: ST856A
- Traction frame support: AC903A
- 1 chrome-plated copper nickel frame: AC930A

Assembly on HSH bed (bedside cabinet support): it is attached with the following elements:

- Kinetec head section frame - PR03 crossbeam: ST856A
- 1 chrome-plated copper nickel frame: AC930A

Installation

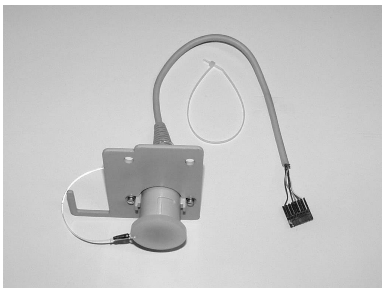
1. Press the Head Section Raise button to bring it to its high position.
2. SH bed only: insert the AC903A traction frame support in the spaces provided on the bedframe under the Head Section and lock it with the aid of the two clips provided.
3. Insert the ST856A Kinetec frame at the headend of the bed in the spaces provided on the AC903A (SH bed) traction frame or bedframe (HSH bed) supports.
4. Insert the AC930A frame in the spaces provided on the bedframe at the foot section of the bed. To do this, the two black knobs of the frame are first loosened then tightened again once the frame is in place
5. Fit the ST860A Kinetec frame. To do this, the lengthwise bar of the frame must be attached to the middle of the ST856A bar (headend) with the clamp provided, and the vertical bar must be fixed to the middle of the bed's footboard by means of the two clamps provided. One of the clamps must be attached to the AC930A frame and the other under the bedframe. Press one clamp towards the other by means of the knobs provided to ensure the frame is correctly secured.

7.2.18 AD090A assembly and cabling kit for hand-held control unit: AD091A.

The optional hand pendant control unit AD091A can be used with this kit.

The kit consists of:

- connection kit
  (cable, board and white plug)
- cable tie



1512A712.tif

Tools required:

1 x 4mm Allen key
1 x 3mm Allen key
1 wire cutter

Installing the kit:

1. Check the contents of the kit.
2. Apply the brakes, adjust the bed to the high position then bring the Head Section and Knee Section to the low position.
3. Unplug the bed from its electrical power supply. If the bed has a battery, set the lock-out switches to "locked out" position (padlock closed).

WARNING

Electric current flows through the connections, when the bed is plugged in. Technical personnel may be injured if the bed is not unplugged from its power source.

4. Put the side-rail (right hand side of the patient) in the low position.
5. Remove the hard surfaces from the Head and central sections of the bedframe (see figure 1).

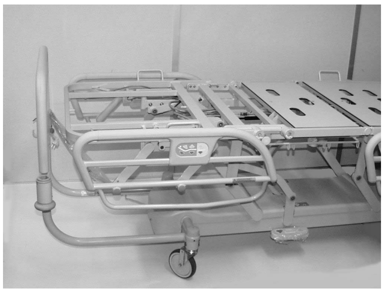


Figure 1 1512A713.tif

6. With the 4mm Allen key, remove the two screws (A) securing the right-hand Head Section guide rod (see figure 2)

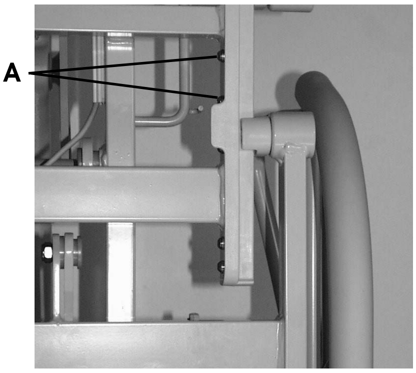


Figure 2 1512A714.tif

7. Hold the plate in place, and re-attach the guide rod onto the intermediate frame, with the screws (A) (see figure 3)

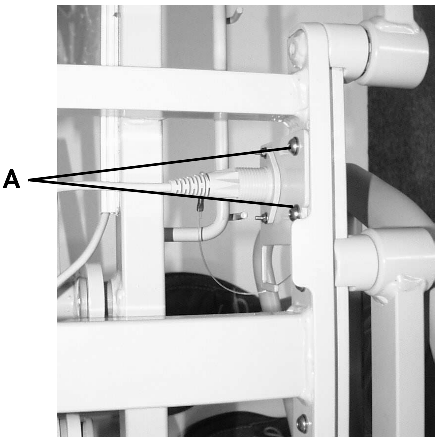


Figure 3 1512A715.tif

8. With the 3mm Allen key, remove the two screws (B) holding the junction box under the central crossbeam of the base (see figure 6).
9. Pull the cable out of the notches of the junction box and remove the printed circuit (see figure 5).
10. Fit the cable of the connection kit to the printed circuit at C1, C2 or C3 according to availability (markings under the printed circuit).

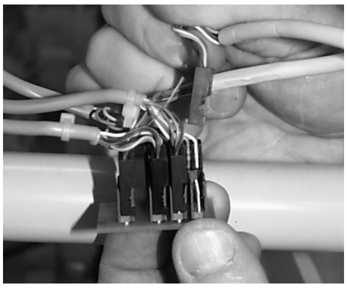


Figure 4 1512A710.tif

11. Refit the printed circuit into the junction box, and the cables into the notches provided (see figure 5).

Note: the notch diameters are smaller at the side-rail cable end.

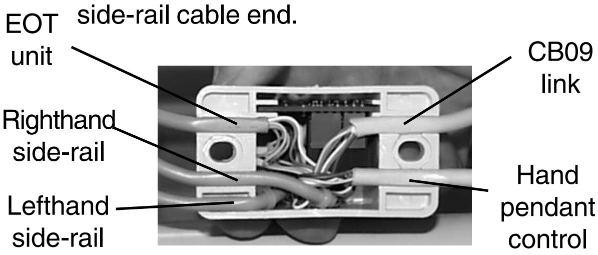


Figure 5 1512A708.tif

12. Reinstall the junction box and secure it with the two corresponding screws, using the 3mm Allen key (see figure 6).

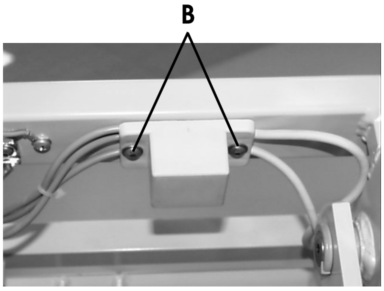


Figure 6 1512A711.tif

13. Tie the hand-held control unit cable and the power supply cable together with the plastic tie, and cut the end of the wire tie with the wire cutter.
14. Remove the sealing plug (D) from the bedframe socket (see figure 7), in order to connect the hand pendant control unit (not included in the connection kit).

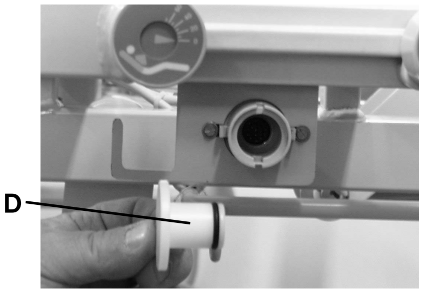


Figure 7 1512A716.tif

Note: the seal must always be in place when the hand pendant control unit is not connected.

Function checks:

1. Plug the bed into the power source again. If the bed has a battery, set the lock-out switches to the "unlocked" position (padlock open).

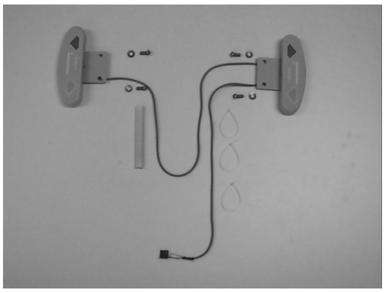
2. Connect the hand-held control unit AD091A and check the operation of the Head Section and Knee Section functions.

   In case of malfunction, check **RAP 2.14**, section 2 of this manual, or contact your national Hill Rom representative (refer to last page of this manual).

7.2.19 Variable Height pedal kit: AD098A.

This kit contains all the elements required to install the Variable Height pedal.

It consists of:
- set of pedals
- bag containing 4 screws, 4 washers and 3 wire ties
- conduit



1512A705.tif

Tools required:

1 x 3mm Allen key

1 x 5mm Allen key

1 Small flat blade screwdriver

1 wire cutter

1 meter

Installing the kit:

1. Check the contents of the kit.
2. Apply the brakes, put the Head Section and Knee Section horizontal, then remove the hard surfaces.
3. Remove all the accessories from the bed.
4. Bring the sleep surface to a height of 65cm from the ground.
5. Unplug the bed from its electrical power supply. If the bed has a battery, set the lock-out switches to the “locked out” position (padlock closed).

WARNING

Electric current flows through the connections when the bed is plugged in. Technical personnel may be injured if the bed is not unplugged from its power source.

6. Put the side-rails in the intermediate position.
7. With the 3mm Allen key, unscrew the four screws securing the headend and footend covers of the bed. Recover the washers.

8. Remove the headend cover of the bed but leave the footend cover in place.
9. Position the two pedals on the long sides of the chassis. The pedal with two cables must be on the left (viewpoint of a patient lying down). Note that the cable interconnecting the two cables lies along the foot end with respect to the conduit (see figure 1).

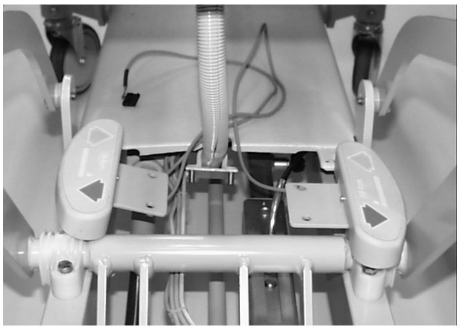


Figure 1 1512A704.tif

10. Pass the lefthand pedal between the lefthand long side of the chassis and the Variable Height motor rod, and the righthand pedal between the righthand long side and the Trendelenburg/ Reverse Trendelenburg mechanism (see figure 2).

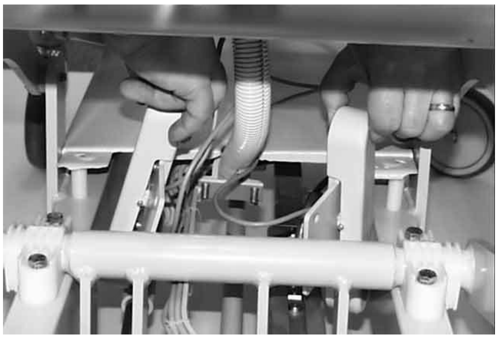


Figure 2 1512A700.tif

11. Plug the bed into the mains supply. If the bed has a battery, set the lock-out switches to the "unlocked" position (padlock open).
12. Put the bed in high position.
13. Unplug the bed from its electrical power supply. If the bed has a battery, set the lock-out switches to the "locked out" position (padlock closed).

WARNING

Electric current flows through the connections when the bed is plugged in. Technical personnel may be injured if the bed is not unplugged from its power source.

14. With the 5mm Allen key, fit the two pedals on the inserts provided under the two long sides of the chassis.
15. Tip over the footend cover onto its side.
16. With the 3mm Allen key, remove the screws securing the chasis junction box (A) (see figure 3).

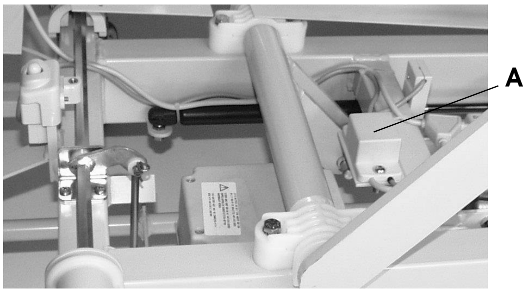


Figure 3 1512A418.tif

17. Note down how the cables run through the junction box, then remove the printed circuit.
18. Connect the pedal cable to the connector C1, C2 or C3 (according to availability) of the chassis junction box.
19. Fit the printed circuit into the chassis junction box and push the cables into the relevant grooves. Note: the groove diameters differ at each end of the junction box due to the diameter of the cables (see figure 4).

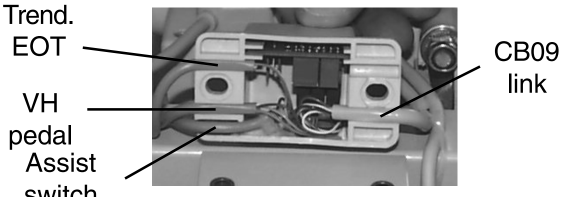


Figure 4 1512A709.tif

20. With the 3mm Allen key, fix the junction box onto the chassis.
21. Fit the conduit (C) supplied on the lefthand side of the chassis as shown in figure 6.

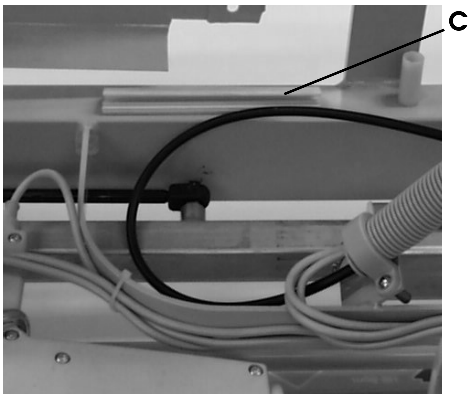


Figure 5 1512A702.tif

22. Open the conduit (C) with the flat blade screwdriver, and lay the cable of the righthand cable in it (see figure 5).
23. Fix the cables of the lefthand pedal to the other cables with the three plastic ties (D) supplied (see figure 5), then cut the ends of the ties with the wire cutters.

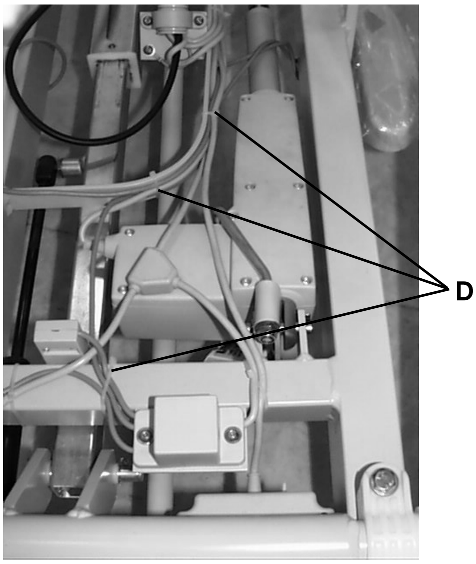


Figure 6 1512A706.tif

24. Reinstall the headend and footend covers and secure them with the 3mm Allen key.

Function checks:

1. Plug the bed into the power source again. If the bed has a battery, set the lock-out switches to the "unlocked" position (padlock open).
2. Test the operation of the raise and lower functions on both pedals.

   In case of malfunction, check **RAP 2.15**, section 2 of this manual or contact your national Hill Rom representative (refer to last page of this manual).

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